

U.S. Association for Computational Mechanics

13th U.S. National Congress on
Computational Mechanics

July 26 – 30, 2015

San Diego, California



13th U.S. National Congress on Computational Mechanics
General Program at a Glance

	Sunday July 26	Monday July 27	Tuesday July 28	Wednesday July 29	Thursday July 30
7:30	Registration 3:00-8:00	Registration	Registration	Registration	Registration
8:30		Welcome			
9:00		Plenary Lecture	Plenary Lecture	Plenary Lecture	
9:45		Break	Break	Break	
10:00					
10:30		Technical Session 1	Technical Session 4	Technical Session 7	
11:00		Lunch	Lunch	Lunch	
12:00		Semi-Plenary Lecture	Semi-Plenary Lectures	Semi-Plenary Lectures	
1:00		Technical Session 2	Technical Session 5	Technical Session 8	
2:00		Break	Break	Break	
3:00					
4:00		Technical Session 3	Technical Session 6	Technical Session 9	
4:30					
5:00					
6:00			AHPCRC Poster Session	Banquet Reception	
6:30				Awards and Banquet	
7:00					
8:00					
9:00					

The 13th U.S. National Congress on Computational Mechanics
Manchester Grand Hyatt
San Diego, CA
July 26 – 30, 2015

Conference Co-Chairmen

Professor Yuri Bazilevs, University of California, San Diego
Professor Dave Benson, University of California, San Diego

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University of California, San Diego Department of Mechanical and Aerospace
Engineering Alison Marsden, Hidenori Murakami

University of California, San Diego Department of Mathematics Michael Holst,
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San Diego Supercomputer Center (SDSC) Amitava Majumdar

Congress Program Coordinator
Ruth Hengst

Congress Program Staff
Cynthia Steiner



FOREWORD

Welcome to 13th US National Congress on Computational Mechanics (USNCCM13), the premier conference of the United States Association for Computational Mechanics (USACM), held at the Manchester Grand Hyatt Hotel, San Diego, CA, on July 26-30, 2015.

The congress features an extensive five-day technical program that includes three plenary lectures, five semi-plenary lectures, over 100 Minisymposia, a student poster competition, and five short courses. The plenary and semi-plenary lectures feature a mix of senior and mid-career researchers, all of whom are visible and highly cited engineers and scientists representing several important areas in computational mechanics. The minisymposia presentations are likewise given by researchers of international prestige, which further contributes to the exceptional quality of the USNCCM13 technical program.

The USNCCM13 social program features a poolside welcome reception and a conference banquet, both to take place at the conference venue. The association awards and poster-session prizes will be presented at the congress banquet, which you are invited to attend. We are also happy to introduce a new social event at this congress – a meeting of the female researchers in computational mechanics. Although the congress technical program is quite busy, be sure to take time to enjoy San Diego and its surroundings. This part of Southern California is one of the most desirable locations in North America in terms of its geography, climate, and the natural beauty and cultural diversity it offers.

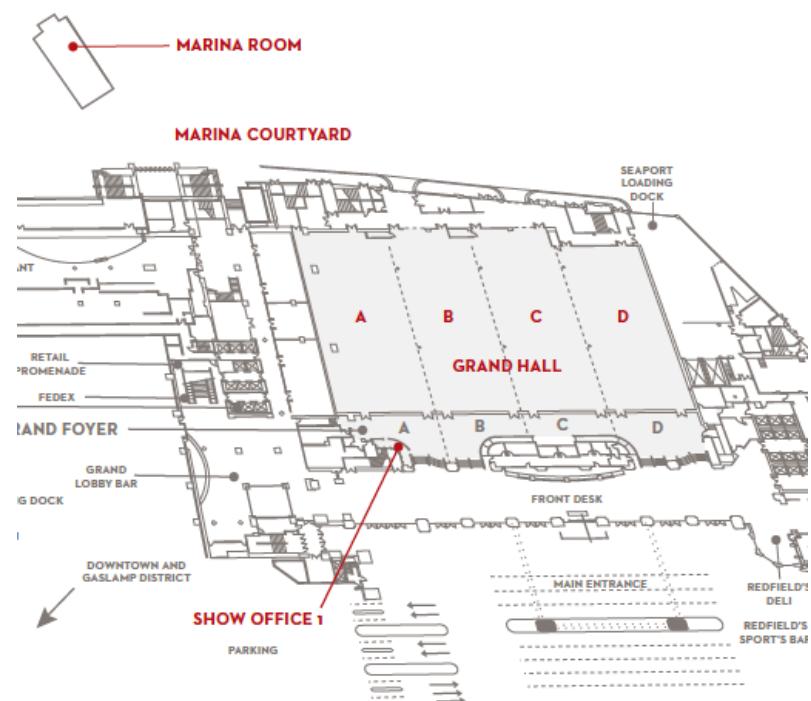
Many contributed to the success of USNCCM13. We thank the scientific and local organizing committees for providing valuable advice for congress organization. We thank the minisymposia organizers for attracting high-quality speakers and assembling a diverse set of technical sessions. We thank the sponsors of USNCCM13 - Army High Performance Computing Research Center (AHPCRC), Elsevier, and Simpleware – for their generous support. We thank all the speakers and poster session participants for their technical contributions.

Finally, special thanks goes to Mrs. Ruth Hengst and her team for their dedicated effort to ensure the success of USNCCM13!

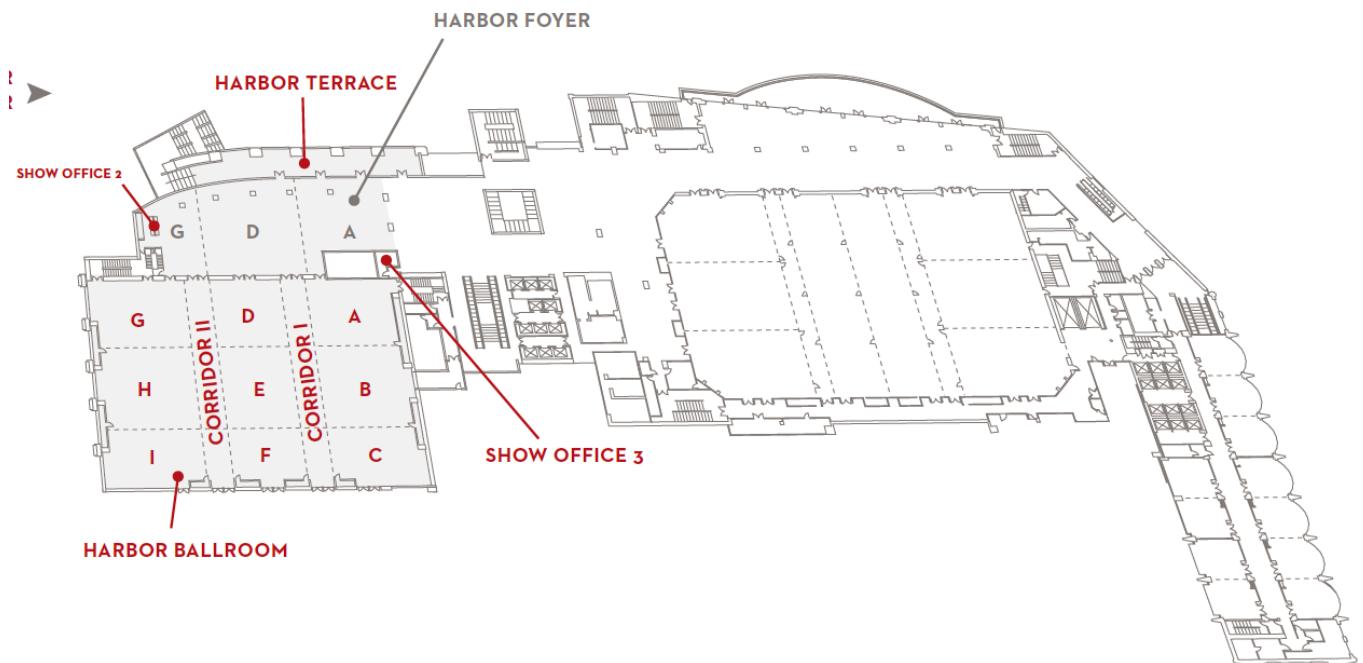
Congress Co-Chairs
Yuri Bazilevs and David Benson
Department of Structural Engineering
University of California, San Diego

Maps of Manchester Grand Hyatt

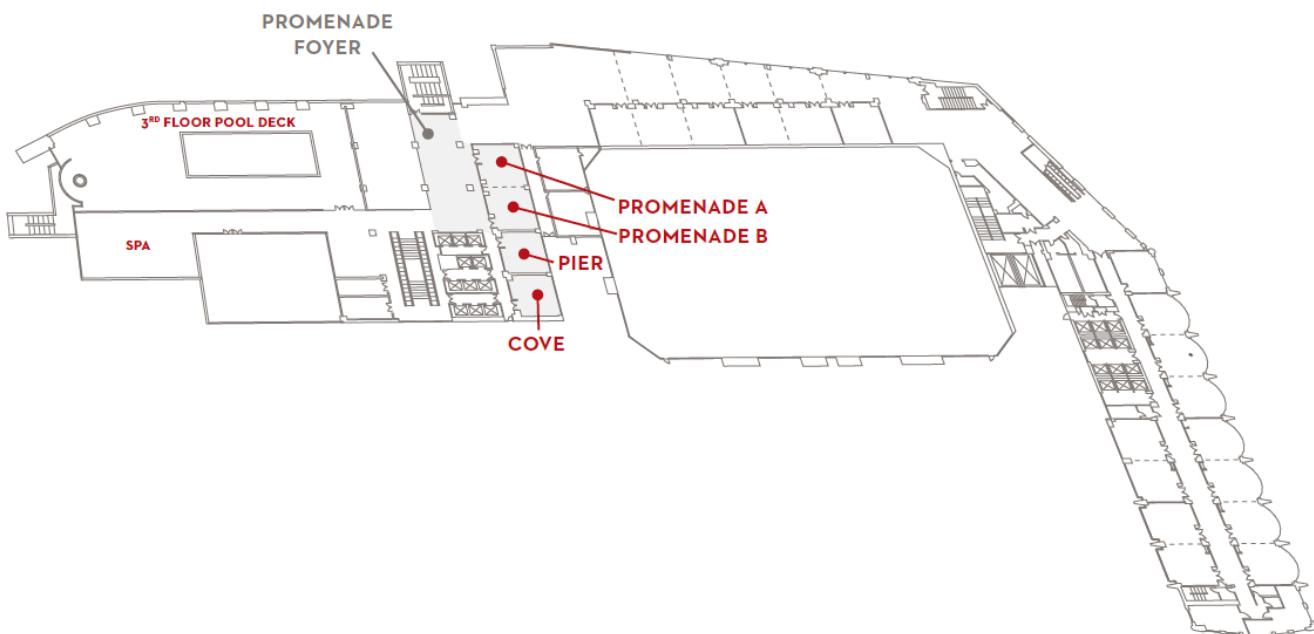
First Level Grand Hall A Marina Room



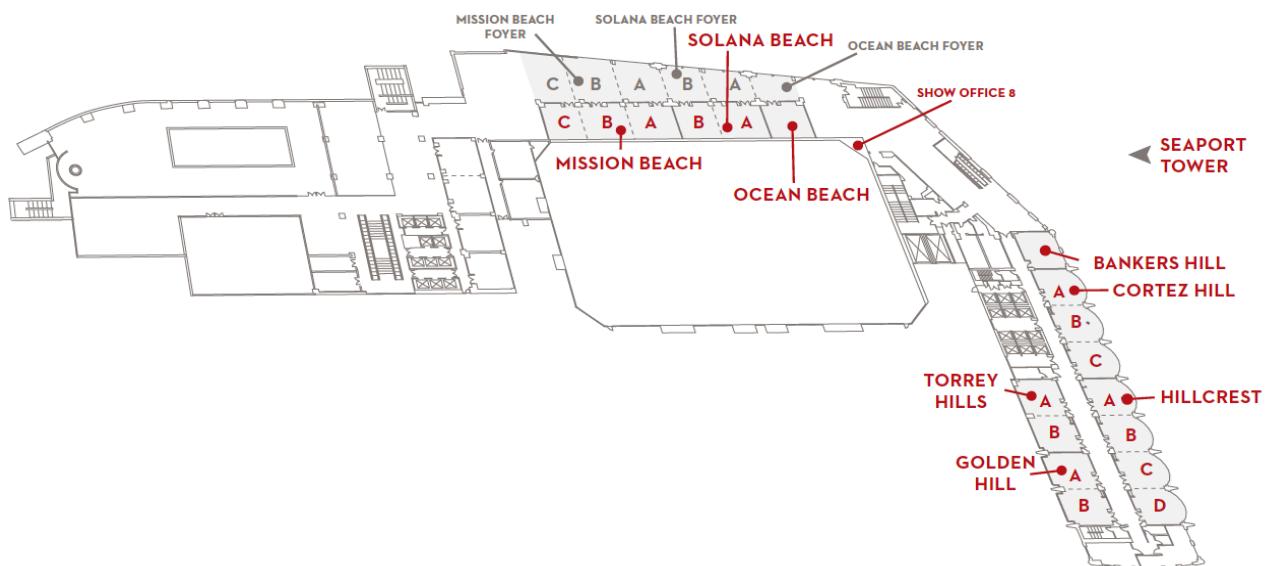
Second Level Harbor Ballroom



Third Level Harbor Tower



Third Level Seaport Tower



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Registration Hours

The registration desk is located in the Harbor Ballroom foyer on the 2nd level of the Manchester Grand Hyatt. The registration hours are:

Sunday, July 26th: 3:00 pm – 8:00 pm

Monday, July 27: 7:30 am – 5:00 pm

Tuesday, July 28: 7:30 am – 5:00 pm.

Wednesday, July 29: 7:30 am – 4:00 pm

Thursday, July 30: 7:30 am – 12:00 pm (noon)

Exhibition Hours

Exhibitors will be available in Harbor Ballroom foyer during the following hours:

Monday, July 25: 8:00 am – 5:00 pm

Tuesday, July 26: 8:00 am – 5:00 pm

Wednesday, July 27: 8:00 am – 4:00 pm

Thursday, July 28: 8:00 am – 12:00 pm (noon)

We encourage you to visit our exhibitor booths throughout the Congress.

AHPCRC Student Poster Competition

The student poster competition will be held on Tuesday evening beginning at 6:30 pm in Grand Hall A on the first level of the Manchester Grand Hyatt. Drinks and light refreshments will be served during the session. Announcement of the winners of the competition will be made during the Awards Ceremony which will be held at the beginning of the banquet in the Harbor Ballroom on Wednesday evening, beginning at 7:30 pm. A list of the student presenters will be available during the poster session.

Our thanks are due to the Army High Performance Computing Research Center for their generous support of this session.

Conference Information

Venue

Manchester Grand Hyatt, San Diego, California, 1 Market Place, San Diego, California, 612-232-1234.

Emergency

The medical emergencies dial 911 (this is the national emergency number for the United States).

Internet

Internet will be available in the Harbor Ballroom foyer and lobby of the technical session meeting rooms. The network is USNCCM Wi-Fi; password is coronado.

Mobile App

A mobile app is available to all registered participants. It is compatible on Android and Mac devices. To download the app, search the app store on your device for USNCCM13. You will need to enter a username and password. The username is the email address you used when paying your registration. The password is coronado.

Author's Compatibility Testing

Presenting authors are encouraged to test their laptop's compatibility with the provided audiovisual equipment by going to the room where your presentation will be held sometime before your session starts. Each session is preceded by a break; we strongly advise the presenters to use the time to make their final check on presentation equipment.

Lunch and Dinner

Participants are on their own for lunch and dinner. There are many places to eat around and in the hotel. We encourage you to check out Seaport Village located behind the hotel.

Technical Sessions

The technical program consists of three Plenary and five Semi-Plenary lectures and over 100 mini-symposia, with approximately 1200 presentations divided into technical sessions. The program begins each day with a plenary lecture (Harbor Ballrom) followed by parallel technical sessions. The afternoon program begins with two parallel Semi-Plenary Lectures (Harbor ABC and Harbor DEF), followed by two sets of parallel technical sessions with a break in between. In the schedule included in the program book, each presenting author has an asterisk * by their name. Keynote speakers are designated with a ** before the title of their presentation.

Abstracts are available for viewing online at <http://submissions.usnccm.org/schedule/>. They may also be downloaded from the congress website at 13.usnccm.org.

Conference Special Events

Sunday, July 26

9:00 am – 5:00 pm, Seaport Tower, 3rd level, Manchester Grant Hyatt

Pre-Congress Short Courses

Pre-Congress short courses will be offered to paid participants only. Registration fees are \$250.

Sunday, July 26

6:00 pm – 8:00 pm, 4th Level Pool Deck

Welcome Reception

The USNCCM13 welcoming reception will take place on the 4th level at the Pool Deck area. All registered attendees are welcome.

Tuesday, July 28

6:30 pm – 8:30 pm, Marina Room

Women Researchers Forum

Organized by Prof. A. Kim and sponsored by Elsevier.

Tuesday, July 28

6:30 pm – 8:00 pm, Grand Hall A, 1st Level

AHPCRC Student Poster Competition

Wednesday, July 29

6:30 pm – 7:15 pm., Harbor Ballroom Foyer

Congress Banquet Reception

The conference banquet reception will take place from 6:30 – 7:15 in the Pre-function area of Harbor Ballroom. All paid registrants are welcome to attend.

Wednesday, July 29

7:15 pm

Awards Presentations

The 2015 USACM Honors and Awards will be presented at the beginning of the banquet in the Harbor Ballroom. Student poster awards will also be made at this time.

Wednesday, July 29

7:30pm – 9:30 pm, Harbor Ballroom

Congress Banquet

The conference banquet will take place from 7:45 p.m.-9:30p.m. in the Harbor Ballrom. All registered participants are welcome to attend. Additional banquet tickets for guests can be purchased for \$125 at the registration desk until noon on Wednesday, July 29.

Thursday, July 30

12:30 pm – 2:00 pm, Harbor Ballroom Foyer

Closing Break

Coffee and light refreshments will be available in the Harbor Ballroom Foyer.

Exhibitors/Sponsors

Army High Performance Computing Research Center (AHPCRC)

The Army High Performance Computing Research Center (AHPCRC), a collaboration between the U.S. Army and a consortium of university and industry partners, addresses the Army's most difficult scientific and engineering challenges using high performance computing (HPC). AHPCRC seeks to develop the potential of HPC as a means of addressing the real-world needs of today's warfighter. In addition, AHPCRC also fosters the education of the next generation of scientists and engineers—including those from racially and economically disadvantaged backgrounds—in the fundamental theories and best practices of simulation-based engineering sciences and high performance computing. AHPCRC consortium members are: Stanford University, High Performance Technologies, Inc., Morgan State University, New Mexico State University at Las Cruces, the University of Texas at El Paso, and the NASA Ames Research Center.

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As an international society of more than 13,000 individual members, SIAM represents applied and computational mathematicians, computer scientists, and various other scientists and engineers. Members include researchers, educators, practitioners, and students from over 90 countries working in industry, laboratories, government, and academia. In addition, SIAM is proud to claim almost 500 institutional members representing a wide variety of organizations throughout the world.

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Technical Sessions at a Glance

TS1	Technical Session 1	Monday, July 27, 10:00 am – 12:00 pm
TS2	Technical Session 2	Monday, July 27, 2:00 pm – 4:00 pm
TS3	Technical Session 3	Monday, July 27, 4:30 pm – 6:30 pm
TS4	Technical Session 4	Tuesday, July 28, 10:00 am – 12:00 pm
TS5	Technical Session 5	Tuesday, July 28, 2:00 pm – 4:00 pm
TS6	Technical Session 6	Tuesday, July 28, 4:30 pm – 6:30 pm
TS7	Technical Session 7	Wednesday, July 29, 10:00 am – 12:00 pm
TS8	Technical Session 8	Wednesday, July 29, 2:00 pm – 4:00 pm
TS9	Technical Session 9	Wednesday, July 29, 4:30 pm – 6:30 pm
TS10	Technical Session 10	Thursday, July 30, 8:30 – 10:30 am
TS11	Technical Session 11	Thursday, July 30, 11:00 am – 1:00 pm

USNCCM13 Session Times for Minisymposia

MS #	Minisymposium Title	Technical Sessions
001	Minisymposium in Memory of Ted Belytschko: Advances in Meshfree, Particle, XFEM, GFEM, and Related Methods	TS1 – TS8
101	Topics in Computational Biomechanics	TS7 - TS9
102	Folds, Twists and Bends: Differential Growth-Induced Morphology in Biology and Physics	TS5, TS6
103	Computational Bioengineering	TS1 – TS3
104	Modeling of Vascular Tissue	TS8
105	Biomedical Fluid Mechanics and FSI	TS5, TS6
106	Advances and Applications	TS4, TS5
107	Recent Advances in Small-Scale Bio/Inorganic Interface	TS6
108	Contemporary Models of Soft Biosolids: Biological Tissues, Scaffolds, and Cells	TS7
109	Parallel Processing Techniques and Applications in Medicine	TS8
110	Computational Mechanics and Biology of Human Tissues	TS9
111	Direct and Inverse Methods for Cardiovascular and Pulmonary Biomechanics	TS1-TS3
112	Computational Modeling and Simulation of the Cardiovascular System	TS4-TS7
113	Phase Field Methods for Moving Interfaces in Physics and Biology	TS1-TS4
201	Advances in Computational Methods for Modeling Transport in Porous Media	TS10, TS11
202	Flows With Moving Boundaries and Interfaces	TS1, TS2, TS7
203	International Symposium of High-Order Methods for Computational Fluid Dynamics	TS1-TS7

204	Simulation Techniques for Particulate Flow Problems	TS3
205	Free and Moving Boundary Problems: Methods and Applications	TS4-TS7
206	Numerical Solution of the Incompressible Navier Stokes Equations: Old and New Challenges	TS1, TS2
207	Finite Element Methods and High-Performance Computing for Environmental Fluid Mechanics	TS7-TS9
208	Large Eddy and Direct Numerical Simulations with Geophysical Applications	TS1-TS4
209	Advances in Turbulence-Resolving Computations and Applications to Complex Flows	TS5, TS6
210	Modeling Flow and Transport in Heterogenous Porous Media	TS8
301	Multiscale Computational Homogenization for Bridging Scales in the Mechanics and Physics of Complex Materials	TS1-TS4
302	Multi-Scale and Multi-Physics Computations in Fluids and Solids	TS4, TS5
303	Recent Progress in Multi-Scale Modeling at the Intersection of Ab-Initio Methods, Mechanics and Mathematics	TS2, TS3, TS5, TS6, TS8, TS9
304	Concurrent Multi-Length Scale Modeling: From Finite Elements to Atoms and Electrons	TS1-TS3
305	Multiscale Modeling and Characterization of Multiphysics for Nano, Bio and Smart Materials	TS9-TS11
306	Computational, Multiscale and Experimental Mechanics of Fibers and Fibrous Materials	TS9-TS11
307	Multiscale Modeling and Simulation of Fracture and Damage in Quasi-Brittle Solids	TS6-TS8
308	Multiscale Modeling of Granular Materials	TS11
309	Atomistic Computation of Continuum Quantities	TS8, TS9
310	Multiscale Simulation for Failure and Uncertainty Quantification in Engineering Applications	TS5-TS8
401	Computational Stability Analysis	TS1, TS2
402	Numerical Methods for Hydraulic Fracture Simulation	TS3-TS5
403	Numerical Modeling and Computational Methods of Impact and Blast Problems	TS1-TS4
404	Recent Advances in Computational Fracture Mechanics	TS10, TS11
406	Computational Fracture Mechanics	TS1-TS5
407	Cohesive Zone Models—Fundamentals and Multiscale Applications	TS10, TS11
408	Computational Modeling of Extreme Loading Environments	TS6-TS8
409	Computational and Experimental Investigation of Manmade and Natural Disasters	TS7, TS8
410	Mathematical and Numerical Modeling of Degradation of Materials and Structures	TS3-TS5
412	Pavement Mechanics and Simulation Mini-Symposium	TS10, TS11
413	Modeling Dynamic Response of Heterogenous Materials	TS1, TS2
414	Recent Advances in Mesh Adaptivity for Inelasticity, Damage, Crack Propagation and Failure	TS11
502	Immersed/embedded/Fictitious Domain Methods and Their Application in Analysis and Optimization	TS1-TS5

503	Model and Solution Reduction Methods for Direct and Inverse Problems in Computational Mechanics	TS6-TS9
504	Optimization with CFD	TS9, TS10
505	Advances in Topological Optimization with Application to Advanced Manufacturing	TS6-TS8
506	Advances in Computational Methods for Inverse Problems	TS1-TS5
601	Enabling Software and Hardware Technologies Towards Exascale	TS7, TS8
602	Iterative Methods and Parallel Computing	TS1-TS3
604	Challenges in Scientific Computing at Extreme Scale	TS4, TS5
701	Isogeometric Methods	TS2, TS3, TS5, TS6
702	Peridynamics and Its Applications	TS1, TS2, TS4, TS5
703	Advanced Finite Elements for Complex-Geometry Computations: Tetrahedral Algorithms and Related Methods	TS8, TS9
704	Advances in the Boundary Element Method	TS10, TS11
705	Quasicontinuum and Other Atomistic-to-Continuum Coupling Techniques	TS1-TS4
706	Advancement in Hydrocodes	TS4-TS6
707	Isogeometric Methods for Complex and Multiphysics Systems	TS8, TS9
708	Symposium on Trends in Unstructured Mesh Generation-Mesh Trends 10	TS1-TS3
709	Advances in Numerical Methods for Linear and Non-Linear Dynamics	TS6-TS11
710	Advances and Applications of the Generalized/Extended Finite Element Method	TS6, TS7
711	Polygonal and Polyhedral Discretizations in Computational Mechanics	TS7-TS9
712	Computational Methods for Modeling Interfaces with Complex/Evolving Topologies	TS10, TS11
714	Voronoi Dual Meshing and Simulation	TS11
715	Advances in Implicit/Explicit (IMEX) Time Integration of Multiphysics Systems	TS9
716	Recent Advances in High Order Finite Element Methods	TS8-TS10
801	Fluid Structure Interaction Algorithms and Applications	TS9, TS10
802	Immersed and Advanced Fluid-Structure Interaction Computational Strategies	TS3
803	Fluid-Structure Interaction	TS3, TS4
804	Computational Modeling of Contact and Embedded Interfaces	TS1, TS2
805	Advanced Discretization Methods for Interface Problems: Theory, Algorithms and Applications	TS9, TS10
807	Stabilized and Multiscale Methods for Interface Mechanics	TS7, TS8

808	Innovative Methods for Fluid-Structure Interaction	TS9
809	Particle-Based Methods in Fluid Mechanics	TS4, TS5
901	Uncertainty Quantification Methods for Complex Mechanics Models	TS6-TS8
902	Model Error Assessment in Computational Physical Models	TS7, TS8
903	Uncertainty Quantification for High-Dimensional Stochastic Processes and Their Applications	TS10
904	Scalable Methods for Uncertainty Quantification	TS6 -TS8
905	Stochastic Methods in Computational Mechanics of Random Materials	TS5-TS7
906	Calibration, Validation, and Bayesian Approaches in Predictive Modeling Simulation	TS1-TS4
907	Randomness, Fractals, and Computational Mechanics	TS9
908	Applications of Error Estimation and Model Adaptation in Computational Mechanics	TS1-TS4
909	Validation and Uncertainty Quantification in Real World Applications: Challenges & Opportunities	TS8
1001	Microstructure-Governed Material Deformation: Theoretical and Computational Methods, Models and Outcomes	TS7-TS11
1002	Advanced Computational Method and Theory for Predicting Material Behaviors in Various Length Scales	TS10, TS11
1003	Material Design and Material Optimization	TS1- TS6
1004	Predictive Modeling of the Co-Evolution of Microstructure	TS9,TS10
1005	Multiphysical Modeling of Geomaterials	TS9-TS11
1006	Non-Classical Continuum Models for Materials With Microstructure	TS8
1007	Computational Modeling of Material Behavior in Extreme Environments	TS11
1008	Modeling Materials with Coupled Physics (thermo- electro- chemo- and magneto-mechanics)	TS5-TS7
1009	Integration of Crystal Plasticity into Modeling and Simulations of Materials Across Different Length and Time Scales	TS10, TS11
1010	Stochastic Material Characterization for Fiber Reinforced Composites	TS10
1011	Mechanical Properties of Randomly Cross-Linked Semiflexible Fibrous Materials	TS11
1012	Advances in Computational Methods for Heterogenous Materials	TS10, TS11
1013	Modeling and Simulation of 3D Printing and Additive Manufacturing	TS1-TS4

Plenary/Semi-Plenary Lectures

Plenary	Monday, July 27	9:00 am – 9:45 am	(Harbor Ballroom)
Professor Thomas J.R. Hughes, University of Texas at Austin			
<i>Isogeometric Analysis: Ten Years After</i>			
Semi-Plenary	Monday, July 27	1:00 pm – 1:45 pm	(Harbor Ballroom ABC)
Professor René de Borst, University of Glasgow			
<i>Computational Mechanics of Interfaces and Evolving Discontinuities</i>			
Semi-Plenary	Monday, July 27	1:00 pm – 1:45 pm	(Harbor Ballroom DEF)
Professor Yongjie Jessica Zhang, Carnegie Mellon University			
<i>Volumetric T-spline Construction for Isogeometric Analysis</i>			
Plenary	Tuesday, July 28	9:00 am – 9:45 am	(Harbor Ballroom)
Professor Tayfun Tezduyar, Rice University			
<i>Space-Time Computational FSI Techniques</i>			
Semi-Plenary	Tuesday, July 28	1:00 pm – 1:45 pm	(Harbor Ballroom ABC)
Professor Somnath Ghosh, Johns Hopkins University			
<i>Computational Biomaterials Science</i>			
Plenary	Wednesday, July 29	9:00 am – 9:45 am	(Harbor Ballroom)
Professor Eugenio Oñate, CIMNE			
<i>A Particle-Discrete-Finite Element Method for Analysis of Particulate Flows and Their Interaction with Structures</i>			
Semi-Plenary	Wednesday, July 29	1:00 pm – 1:45 pm	(Harbor Ballroom ABC)
Professor Serge Prudhomme, Ecole Polytechnique de Montréal			
<i>The Hybridizable Discontinuous Galerkin Methods</i>			
Semi-Plenary	Wednesday, July 29	9:00 am – 9:45 am	(Harbor Ballroom DEF)
Professor Alison Marsden, Stanford University			
<i>Patient Specific Modeling in Cardiovascular Disease: From Computation to Clinic</i>			

**13th U.S. National Congress on
Computational Mechanics**

TECHNICAL PROGRAM

Plenary Speaker, Monday, July 27, 2015

9:00 – 9:45 am, Harbor Ballroom

Isogeometric Analysis: Ten Years After

Thomas J.R. Hughes, ICES, University of Texas at Austin

Abstract: Isogeometric Analysis [1,2] was created to address the major impediment to the process of engineering product development, namely, the conversion of CAD descriptions to analysis-suitable formats leading to finite element meshes. Designs are encapsulated in Computer Aided Design (CAD) systems. Simulation is performed in Finite Element Analysis (FEA) systems. The conversion process involves many steps, is tedious and labor intensive, and is the major bottleneck in the engineering design-through-analysis process, accounting for more than 80% of overall analysis time.

This year marks the 10th anniversary of the first paper on Isogeometric Analysis [1], published in October of 2005. The key concept utilized in the technical approach is the development of a new paradigm for FEA, based on rich geometric descriptions originating in CAD, resulting in one geometric model that is suitable for both design and analysis. In the ten years since its inception, Isogeometric Analysis has become a focus of research within both the fields of FEA and CAD and is rapidly becoming a mainstream analysis methodology and a new paradigm for geometric design.

I will describe areas in which progress has been made in developing new and improved Computational Mechanics methodologies to efficiently solve vexing problems that have been at the very least difficult, if not impossible, within traditional FEA. I will also describe current areas of intense activity and areas where problems remain open, representing opportunities for future research.

References

- [1] T.J.R. Hughes, J.A. Cottrell and Y. Bazilevs, *Isogeometric Analysis: CAD, Finite Elements, NURBS, Exact Geometry and Mesh Refinement*, Computer Methods in Applied Mechanics and Engineering, 194, (2005) 4135-4195.
- [2] J.A. Cottrell, T.J.R. Hughes and Y. Bazilevs, *Isogeometric Analysis: Toward Integration of CAD and FEA*, Wiley, Chichester, U.K., 2009.

Biography: Thomas J.R. Hughes holds B.E. and M.E. degree in Mechanical Engineering from Pratt Institute and an M.S. in Mathematics and Ph.D. in Engineering Science from the University of California at Berkeley. He taught at Berkeley, Caltech and Stanford before joining the University of Texas at Austin. At Stanford he served as Chairman of the Division of Applied Mechanics, Chairman of the Department of Mechanical Engineering, Chairman of the Division of Mechanics and Computation, and occupied the Crary Chair of Engineering. At Austin, he is Professor of Aerospace Engineering and Engineering Mechanics and holds the Computational and Applied Mathematics Chair III. He is a Fellow of the American Academy of Mechanics, ASME, AIAA, ASCE, AAAS, and Found, Fellow and Past President of USACM and IACM, past Chairman of the Applied Mechanics Division of ASME, past Chairman of the US National Committee on Theoretical and Applied Mechanics, and co-editor of the international journal *Computer Methods in Applied Mechanics and Engineering*.

Dr. Hughes is one of the most widely cited authors in Engineering Science. He has received the Huber Prize and Von Karman Medal from ASCE, the Timoshenko, Worcester Reed Warner, and Melville Medals from ASME, the Von Neumann Medal from USACM, the Gauss-Newton Medal from IACM, the Computational Mechanics Award of the Japan Society of Mechanical Engineers, the Grand Prize from the Japanese Society of Computational Engineering and Sciences, the Computational Mechanics Award for the Japanese Association for Computational Mechanics, and the Humboldt Research Award for Senior Scientists from the Alexander von Humboldt Foundation.

He is a member of the US National Academy of Sciences, the US National Academy of Engineering, the American Academy of Arts and Sciences, the Academy of Medicine, Engineering and Science of Texas, and a Foreign Member of the Royal Society of London, the Austrian Academy of Sciences, and the Istituto Lombardo Accademia di Scienze e Lettere. Dr. Hughes has received honorary doctorates from the universities of Louvain, Pavia, Padua, Trondheim, Northwestern, and A Coruña.

Semi-Plenary Speaker, Monday, July 27, 2015

1:00 – 1:45 pm, Harbor ABC

Computational Mechanics of Interfaces and Evolving Discontinuities

René de Borst, University of Glasgow

Abstract: Two main approaches can be distinguished for resolving interfaces and evolving discontinuities. Within the class of discrete models, cohesive-surface approaches are probably the most versatile, in particular for heterogeneous materials. However, limitations exist, in particular related to stress triaxiality, which cannot be captured well in standard cohesive-surface models. In this lecture, we will present an elegant enhancement of the cohesive-surface model to include stress triaxiality, which still preserves the discrete character of cohesive-surface models. Subsequently, we will outline how the cohesive-surface approach to fracture can be extended to multi-phase media, in particular fluid-saturated porous media.

Whether a discontinuity is modelled via a continuum model, or in a discrete manner, advanced discretisation methods are needed to model the internal free boundary. A powerful method is isogeometric analysis. Examples will be given, including analyses, including delamination in layered shells.

Isogeometric analysis is also very suitable for the discretisation of higher-order continua by virtue of the smoothness of its basis functions, as will be demonstrated at the hand of a gradient-enhanced continuum damage model. Another recent development in continuum approaches is the phase-field theory, and we will relate this to a gradient damage model. Finally, we will elaborate a phase-field approach for cohesive-surface models, which, although being a continuum approach, results in a well-posed boundary value problem, and is therefore free of mesh dependence.

Biography: René de Borst received an MSc in civil engineering in 1982, and a PhD in 1986, both from Delft University of Technology (cum laude). In 1988 he was appointed as professor in computational mechanics at the Faculty of Civil Engineering, and in 1999 he became professor of engineering mechanics at the Faculty of Aerospace Engineering of this university, where he served as vice-dean since 2004. In 2000 he was appointed Distinguished Professor at this university. From 2007 until 2011 he was Dean of the Faculty of Mechanical Engineering and Distinguished Professor at Eindhoven University of Technology. He has held visiting professorships in Albuquerque (New Mexico), Tokyo, Barcelona, Milan, Cachan, Metz, Lyon, has been a visiting Directeur de Recherche at CNRS in France, a Marie-Curie Distinguished Researcher in Lublin, and the John Argyris Visiting Professor in Stuttgart. Currently, he is the Regius Professor of Civil Engineering and Mechanics at the University of Glasgow, the oldest chair in engineering in the UK, established in 1840 by Queen Victoria.

René de Borst is editor-in-chief of the International Journal for Numerical Methods in Engineering, editor of the International Journal for Numerical and Analytical Methods in Geomechanics, editor-in-chief of the Encyclopedia of Computational Mechanics, associate editor of the Aeronautical Journal, and member of the editorial board of another twenty journals. He is recipient of several honours and awards, including the Composite Structures Award, the Max-Planck Research Award, the IACM Computational Mechanics Award, the NWO Spinoza Prize (highest scientific distinction in the Netherlands), and the Royal Society Wolfson Merit Award. He is a Fellow of the Institution of Civil Engineers, Fellow of the International Association of Computational Mechanics, and Fellow of the International Association for Fracture Mechanics of Concrete and Concrete Structures, a Member of the Royal Netherlands Academy of Arts and Sciences, a Fellow of the Royal Society of Edinburgh, a Member of the European Academy of Sciences and Arts, and an Officer in the Order of National Merit in France.

Semi-Plenary Speaker, Monday, July 27, 2015

1:00 – 1:45 pm, Harbor DEF

Volumetric T-spline Construction for Isogeometric Analysis

Yongjie Jessica Zhang, Carnegie Mellon University

Abstract: In this talk, comprehensive schemes are described to construct rational trivariate solid T-splines for applications in isogeometric analysis. For arbitrary topology objects, we first compute a smooth harmonic scalar field defined over the mesh and saddle points are extracted to determine the topology. By dealing with the saddle points, a polycube whose topology is equivalent to the input geometry is built and it serves as the parametric domain for the trivariate T-spline construction. Boolean operations and geometry skeleton can also be used to build feature-preserving polycubes. A polycube mapping is then used to build a one-to-one correspondence between the input triangulation and the polycube boundary. After that, we choose the deformed octree subdivision of the polycube as the initial T-mesh, and make it valid through pillowing, quality improvement and applying templates to handle extraordinary nodes. The parametric mapping method has been further extended to conformal solid T-spline construction with the input boundary spline representation preserved and trimming curves handled.

In the second part of this talk, I will show a new method termed Truncated Hierarchical Catmull-Clark Subdivision (THCCS), which generalizes truncated hierarchical B-splines to control grids of arbitrary topology and supports local refinement. THCCS basis functions satisfy partition of unity, are linearly independent, and are locally refinable. THCCS also preserves geometry during adaptive h -refinement and thus inherits the surface continuity of Catmull-Clark subdivision, namely C^2 -continuous everywhere except at the local region surrounding extraordinary nodes, where the surface continuity is C^1 . Adaptive isogeometric analysis is performed with THCCS basis functions on a benchmark problem with extraordinary nodes. Local refinement on complex surfaces is also studied to show potential wide application of the proposed method.

Biography: Yongjie Jessica Zhang is an Associate Professor in Mechanical Engineering at Carnegie Mellon University with a courtesy appointment in Biomedical Engineering. She received her B.Eng. in Automotive Engineering, and M.Eng. in Engineering Mechanics, all from Tsinghua University, China, and M.Eng. in Aerospace Engineering and Engineering Mechanics, and Ph.D. in Computational Engineering and Sciences from the University of Texas at Austin. Her research interests include computational geometry, mesh generation, computer graphics, visualization, finite element method, isogeometric analysis and their application in computational biomedicine and engineering. She has co-authored over 100 publications in peer-reviewed international journals and conference proceedings. She is the recipient of Presidential Early Career Award for Scientists and Engineers, NSF CAREER Award, Office of Naval Research Young Investigator Award, USACM Gallagher Young Investigator Award, Clarence H. Adamson Career Faculty Fellow in Mechanical Engineering, George Tallman Ladd Research Award, and Donald L. & Rhonda Struminger Faculty Fellow.

Monday, July 27, Technical Session 1

ROOM	10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM	11:40 AM
TS1 MS1003 Material Design and Material Optimization, Chair(s): Ekkehard Ramm, Junji Kato						
Harbor G	** Maximizing Phononic Band Gaps in Piezocomposite Materials By Means of Topology Optimization	Optimal Design of In-Plane Unit in Composite Plates	Topology Optimization for Path-Dependent Problems	Topology Optimization of Composites Accounting for Non-Linear Interface Phenomena		
	<i>Emilio Silva*, Sandro Vatanabe, Glaucio Paulino</i>	<i>Shin-nosuke Nishi*, Shinsuke Takase, Junji Kato, Kenjiro Terada,</i> <i>Takashi Kyoya</i>	<i>Hiroya Hoshiba*, Junji Kato, Kenjiro Terada,</i> <i>Takashi Kyoya</i>	<i>Matthew Lawry*, Reza Behrou, Kurt Maute</i>		
TS1 MS202 Flows with Moving Boundaries and Interfaces, Chair(s): Tayfun Tezduyar						
Harbor H	** Hybrid Grid and Particle-Based CFD Method for Multi-Physics Engineering Problems	** Unsteady Behavior of Cavitation Bubbles and Induced Shock Waves	Stokes-Cahn-Hilliard Formulations and Simulations of Two-Phase Flows with Suspended Rigid Particles	Finite Element Analysis of Adiabatic Flows	A Local XFEM Method for the Simulation of Multi-Fluid Flows Using the Particle Level Set Method	
	Makoto Yamamoto*	Hiroaki Yoshimura*, Taro Miyazaki	Patrick Anderson*, Nick Jaensson, Martien Hulsen	Ichiro Uchiyama*, Mutsuto Kawahara	Kazem Kamran*, Riccardo Rossi, Eugenio Oate	
TS1 MS001 Minisymposium in Memory of Ted Belytschko: Advances in Meshfree, Particle, XFEM, GFEM, and Related Methods, Chair(s): Wing Kam Liu and J. S. Chen						
Harbor I	**Partition of Unity Methods: Fit for Industrial Use?	Multi-Scale Analysis of Macromolecular Microtubules	A Mixed Finite Element - Crushable Discrete Element Nested Method for Granular Materials	Isogeometric Meshfree Analysis		
	Marc Alexander Schweitzer*, Albert Ziegenhagel	Kim Meow Liew*, Luwen Zhang	Xikui Li*, Zenghui Wang, Yuanbo Liang, Qinglin Duan	Sheng-Wei Chi*, Shih-Po Lin		
TS1 MS103 Computational Bioengineering, Chair(s): Suvrana De						
Bankers Hill	**Damage-Dependent Bio-Heat Transfer Modeling in Thermal Therapy with Consideration of Perfusion Field	Phase-Field Modeling in Computational Bioengineering: Application to Tumor Angiogenesis and Cellular Migration	A Coupled 3D Four-Constituent Tumor Growth Model Based on Continuum Mixture Theory	Modelling Cancellous Bone: An Elastic Mixture Theory Approach	Non-Invasive In-Vivo Quantification of Mechanical Heterogeneity of Invasive Breast Carcinomas	
	Yusheng Feng*, Cliff J. Zhou, Robert Moser	Hector Gomez*, Adrian Moure, Guillermo Vilanova	Mohammad Rahman*, Jun Zhou, Yusheng Feng	S Burhanettin Altan*, Turgut Gksoy	Tengxiao Liu*, Olalekan Babaniyi, Timothy Hall, Paul Barbone, Assad Oberai	

ROOM	10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM	11:40 AM
TS1 MS702 Peridynamics and Its Applications, Chair(s): Erdogan Madenci						
Cortez Hill A	Coupling Approaches for Integrating Meshfree Peridynamic Models with Classical Finite Element Analysis	Analysis of Damage in Anisotropic Media with a New Peridynamic Material Model	A Benchmark Study of Mode I Crack Opening for Brittle Materials	A Peridynamic Model for Hydraulic Fracture		
	David Littlewood*, Stewart Silling, Pablo Seleson, John Mitchell	Mazdak Ghajari*, Lorenzo Iannucci, Paul Curtis	Patrick Diehl*, Marc Alexander Schweitzer, Robert Lipton	Hisanao Ouichi*, Amit Katiyar, John Foster, Mukul Sharma		
TS1 MS705 Quasicontinuum and Other Atomistic-to-Continuum Coupling Techniques, Chair(s): Ellad Tadmor						
Cortez Hill B	**Accuracy of Computation of Crystalline Defects at Finite Temperature		Analytical and Numerical Study of a Simple A Posteriori Error Estimator for a Quasicontinuum Approximation	Quasicontinuum Study of Three-Dimensional Crack Initiation Mechanisms in Bcc-Fe Under Loading Modes I, II and III	Quasicontinuum Methods for Planar Beam Lattices	
	Mitchell Luskin*, Alexander Shapeev		Hao Wang*, Mingjie Liao, Lei Zhang	Jaime Marian*	Lars Beex, Pierre Kerfriden, Claire Heaney, Stephane Bordas*	
TS1 MS401 Computational Stability Analysis, Chair(s): H. Mang						
Cortez Hill C	Direct Time-Integration Method for Solving Nonlinear Dynamic Problems with Large Rotations and Displacements	Influence of Structural Solutions on Strength Behaviour and Instability of Straight Bars	Stability, Buckling and Postbuckling Analysis of Curved Panels	Dynamic Instability of Slender Curved Structures		
	Y. B. Yang*, S. R. Kuo, J. D. Yau	J.B. Obrebski*	Mihaela Nistor*, Yang Zhou, Ilinca Stanciulescu	Yang Zhou*, Ilinca Stanciulescu		
TS1 MS602 Iterative Methods and Parallel Computing, Chair(s): Shinobu Yoshimura						
Cove	**XBraid: A Parallel Multi-Grid-In-Time Software Library		Optimization of Communications for Scalable Algorithms on Supercomputers in Next Generation	A Novel Iterative Solver for Large, Sparse Linear Systems	Performance Comparison of Subdomain Local Solvers in Domain Decomposition Method	
	Ulrike Meier Yang*, Veselin Dobrev, Rob Falgout, Tzanio Kolev, Anders Petersson, Jacob Schroder		Kengo Nakajima*	Phanisri Pratapa*, Phanish Suryanarayana, John Pask	Hiroshi Kawai*, Masao Ogino, Ryuji Shioya, Tomonori Yamada, Shinobu Yoshimura	

ROOM	10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM	11:40 AM
TS1 MS1013 Modeling and Simulation of 3D Printing and Additive Manufacturing, Chair(s): Albert To						
Golden Hill A	**Simulation of Metal Deposition of Ti-6Al-4V Using Coupled Constitutive and Microstructure Models	Efficient Design of Additive Manufactured Cellular Structures by Integration of Micromechanics Modeling and Topology Optimization	Proportional Topology Optimization Method for Frequency Optimization of 3D Printed Components	Microstructure and Shape Optimization of Porous Biomedical Co-Cr-Mo Alloy Fabricated by Electron Beam Melting	Surface Roughness Optimized Alignment of Parts for Additive Manufacturing Processes	
	Lars-Erik Lindgren*, Andreas Lundbck, Robert Pederson	Lin Cheng*, Pu Zhang, Emre Biyikli, Jiaxi Bai, Yiqi Yu, Jakub Toman, Markus Chmielus, Albert To	Xue Wang*, Emre Biyikli, Albert C To	Yuichiro Koizumi*, Arata Okazaki, Akihiko Chiba, Takahiko Kato	Patrick Delfs*, Marcel Tws, Hans-Joachim Schmid	
TS1 MS111 Direct and Inverse Methods for Cardiovascular and Pulmonary Biomechanics, Chair(s): Marek Behr						
Golden Hill B	**Non-Invasive Assessment of Coronary Artery Disease Using Image-Based Computational Fluid Dynamics	Automated Tuning for Parameter Identification in Multi-Scale Coronary Simulations	Arterial Stiffness and Left-Ventricular Function in a 3D Full-Body Scale Deformable Arterial Model	Uncertainty Quantification and Statistics Based Material Modeling for Complex Biomechanical Problems Exemplified for AAA		
	Charles Taylor*	Justin Tran*, Daniele Schiavazzi, Abhay Ramachandra, Andrew Kahn, Alison Marsden	Kevin D. Lau*, Nan Xiao, Mahdi Esmaily-Moghadam, Alison L. Marsden, Jay D. Humphrey, C. Albert Figueira	Wolfgang A. Wall*, Jonas Biehler, Michael Gee		
TS1 MS804 Computational Modeling of Contact and Embedded Interfaces, Chair(s): Mike Puso						
Hillcrest A	**Massively Parallel Strategies for Contact Problems - Interface Detection, Information Transfer, and Solution	Variationally Consistent Quadratic Finite Element Formulations for Contact Problems on Rough Surfaces	Cyclic Steady States of Electro-Mechanical Devices and the High-Order Immersed Boundary Discontinuous-Galerkin Method	A Phase-Field Approach to Fracture for Mortar Contact Problems		
	Rolf Krause*, Patrick Zulian	Kai Willner*, Saskia Sitzmann, Barbara Wohlmuth	Gerd Brandstetter*, Sanjay Govindjee,	Marlon Franke*, Christian Hesch		

ROOM	10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM	11:40 AM
TS1 MS413 Modeling Dynamic Response of Heterogeneous Materials, Chair(s): Varvara Kouznetsova						
Hillcrest B	**External Acoustic Scattering from Periodic Heterogeneous Media Using Analytical Techniques	High-Order Nonlocal Multiscale Homogenization Model for Analysis of Wave Propagation in Composite Materials	Experimentally Validated Multi-Scale Modeling of the Dynamic Response of Composite Materials			
	Michael Leamy*, Jason Kulpe, Karim Sabra	Caglar Oskay*, Tong Hui, Ruize Hu	Miguel Bessa*, Xiaoming Bai, Antonio Melro, Pedro Camanho, L. Guo, Wing Kam Liu			
TS1 MS301 Multiscale Computational Homogenization for Bridging Scales in the Mechanics and Physics of Complex Materials, Chair(s): K. Terada, J. Yvonnet						
Hillcrest C	**Image-Based, High-Performance Multi-Scale Modeling	A Study of Modeling Error in the Computational Homogenization of Complex Microstructures	Reduced-Order Modeling for Highly Dense Heterogeneous Materials	Variational Approach to FFT-Based Homogenization of Non-Linear Materials	Dispersive Computational Continua	
	Karel Matous*, Matthew Mosby	James Ramsey*	Axinte Ionita*, Matthew W. Lewis	Tom de Geus*, Jaroslav Vondrejc, Jan Zeman, Ron Peerlings, Marc Geers	Vasilina Filonova*, Dimitrios Fafalis, Jacob Fish	
TS1 MS203 International Symposium of High-order Methods for Computational Fluid Dynamics, Chair(s): Chunlei Liang						
Hillcrest D	**Robustness of Nodal Discontinuous Galerkin Spectral Element Methods for Conservation Laws	Improving Flux Accuracy of Finite Volume Methods Through Better Reconstruction	Application of the Direct Flux Reconstruction Method to the Euler Equations	Positivity-Preservation Property of Cell-Centered Lagrangian Schemes and Extension to High-Orders of Accuracy	USNCCM Symposium of High-Order Methods for Computational Fluid Dynamics	
	David Kopriva*	Chandan Sejekan*, Carl Ollivier-Gooch	Joshua Romero*, Antony Jameson	Francois Vilar*, Chi-Wang Shu	Chunlei Liang*	

ROOM	10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM	11:40 AM
TS1 MS502 Immersed/embedded/fictitious Domain Methods and Their Application in Analysis and Optimization, Chair(s): Dominik Schillinger						
Mission Beach A	**Higher-Order Immersed B-Spline Finite Elements	Enriched Isogeometric Analysis for Explicit Tracking of Evolving Boundaries	Optimal Topology Design Using Configurational Derivative and Enriched Isogeometric Analysis	Immersogeometric FluidThin Structure Interaction Analysis: Enhanced Conservation and Application to Heart Valve Simulation		
	Fehmi Cirak*, Matija Kecman	Ganesh Subbarayan*, Tao Song, Kritika Upreti	Tao Song*, Hung-yun Lin, Ganesh Subbarayan	David Kamensky*, Ming-Chen Hsu, John A. Evans, Michael S. Sacks, Thomas J. R. Hughes		
TS1 MS403 Numerical Modeling and Computational Methods of Impact and Blast Problems, Chair(s): David C. Weggel						
Mission Beach B	Experiment and Numerical Simulation of Concrete Structure Damage Under Impact Loading	Numerical Simulations of Vehicular Impacts on Single- & Double-Faced W-Beam Guardrails on Sloped Median	A Wave-Based Approach toward Precisely Controlled Dynamic Structural Demolition	Non-Linear Probabilistic Analysis of Concrete Wall Structure Safety Under Aircraft Impact	Dynamic Finite Element Analysis of the Axial Resistance of Steel Sheet Pile Foundations Under Impulse Loads	
	Xu Xiangzhao*, Wang Zhihua, Ning Jianguo	Matthew Gutowski*, Ryan Baker, Daniil Kuvilla, Emre Palta, Howie Fang	Koji Uenishi*, Hiroshi Yamachi	Peter Rosko*, Juraj Kralik	Corey Rice*, Matthew Whelan, Ph.D., Miguel Pando, Ph.D., Vincent Ogunro, Ph.D.	
TS1 MS506 Advances in Computational Methods for Inverse Problems, Chair(s): Assad Oberai and Paul Barbone						
Mission Beach C	**Computational Statistical Inverse Problems with Sparse or Missing Data	Inversion Under Uncertainty Applied to Trace-Gas Transport	Convergence and Noise Statistics in Multiplicative Regularization	Dimension-Independent Likelihood-Informed MCMC		
	Habib Najm*, Khachik Sargsyan, Kenny Chowdhary, Mohammad Khalil	Bart van Bloemen Waanders*, Timothy Wildey, Harriet Li	Orsola Rath Spivack*, Yujun Qiao	Kody Law*, Tiangang Cui, Youssef Marzouk		

ROOM	10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM	11:40 AM
TS1 MS906 Calibration, Validation, and Bayesian Approaches in Predictive Modeling and Simulation, Chair(s): Paul T. Bauman						
TS1 MS206 Numerical Solution of the Incompressible Navier Stokes Equations: Old and New Challenges, Chair(s): Alessandro Veneziani						
Ocean Beach	**Computational Enhancements to Bayesian Design of Experiments Using Gaussian Processes	Optimal Sequential Experimental Design Using Dynamic Programming and Transport Maps	Generalizations of Randomize-Then-Optimize (RTO): Optimization-Based Sampling Algorithms for Bayesian Inference	A Bayesian Framework for Adaptive Selection, Calibration, and Validation of Coarse-Grained Models of Atomistic Systems	Accelerated Model-Based Signal Reconstruction for Magnetic Resonance Thermometry Data in Presence of Uncertainties	
	Brian Williams*, Brian Weaver, Christine Anderson-Cook, Dave Higdon	Xun Huan*, Youssef Marzouk	Zheng Wang*, Youssef Marzouk,	Kathryn Farrell*, J. Tinsley Oden, Danial Faghihi	Reza Madankan*, David Fuentes	
TS1 MS304 Concurrent Multi-length Scale Modeling: From Finite Elements to Atoms and Electrons, Chair(s): Qing Peng, Suvarna De						
Pier	**The Future of LES and DNS in High-Performance Computing	Deconvolution-Based Nonlinear Filtering for Incompressible Flows at Moderately Large Reynolds Numbers	Semi-Implicit Time Discretization of the Incompressible Navier-Stokes Equations: VMS-LES Modeling in a High-Performance Computing Setting	Transient Impinging Jet in Crossflow as a Benchmark Case to Validate Unsteady LES	A Numerical Study for the Effect of Vegetative Canopy on Turbulent Transport of Pollutants	
	Paul Fischer*	Annalisa Quaini*, Luca Bertagna, Alessandro Veneziani	Davide Forti*, Luca Ded, Simone Deparis	Simon Mendez*, Hubert Baya Toda, Olivier Cabrit, Karine Truffin, Gilles Bruneaux, Franck Nicoud	Md Abdus samad Bhuiyan*, Jahrul Alam	
Promenade A						
Promenade A	Development of Deformable 3D Gap Element for Simulation of Asymmetric Thermal Behavior in Nuclear Fuel Rod	Study on the Design of a Nuclear Battery for Space Missions	In-Grid Spring Analysis of Full Spacer Grids with H-Type Springs	A Few Thoughts on the Modeling of Complex Systems		
	Hyo chan Kim*, Yong sik Yang, Dae ho Kim, Yang hyun Koo	Jintae Hong*, Kwang-Jae Son, Jong-Bum Kim, Young-Rang Uhm, Jin-Joo Kim	KyungHo Yoon*, JaeYong Kim, YoungHo Lee, KangHee Lee, HyungKyu Kim, HeungSeok Kang	Sheldon Wang*		

ROOM	10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM	11:40 AM
TS1 MS708 Symposium on Trends in Unstructured Mesh Generation - MeshTrends 10, Chair(s): Steven Owen						
Promenade B	**Toward Exascale-Era Parallel Mesh Generation		How Should Optimal 3D Tetrahedra be Defined and Constructed?	Node-Based Mesh Generation and Adaptive Finite Element Methods	Element-Size Gradation in an Unstructured Tetrahedral Mesh Using Radial Basis Functions	
	Nikos Chrisochoides*, Andrey Chernikov, Daming Feng, Christos Tsolakis		Qiang Du*	Yufeng Nie*	Nick Wyman*, Mike Jefferies, Steve Karman, John Steinbrenner	
TS1 MS406 Computational Fracture Mechanics, Chair(s): Adrian Lew						
Solana Beach A	**The Variational Approach to Fracture and Ductile Materials		A Non-Isothermal Phase-Field Model for Damage in Biphasic Brittle Materials	Efficient Computing of the Phase-Field Model of (Brittle) Fracture Using the Monolithic Scheme and Adaptive Mesh Refinements	Phase Field Modelling of Complex Microcracking in Voxel-Based Models of Cementitious Materials	Phase Field Modeling of Diffusion Induced Fracture in Si Electrodes
	Michael Borden*, Eric Domonell		Markus Radszuweit*, Christiane Kraus	Tymofiy Gerasimov*, Laura De Lorenzis	Thanh Tung Nguyen*, Julien Yvonnet, Qi Zhi Zhu, Michel Bornert, Camille Chateau	Christian Linder*, Xiaoxuan Zhang
TS1 MS208 Large Eddy and Direct Numerical Simulations with Geophysical Applications, Chair(s): Sutanu Sarkar						
Solana Beach B	DNS of Strongly Accelerating Thermal Turbulent Boundary Layer	Wind Energy Simulations in a Mesoscale-LES Nested Model Framework	Cloud Resolving Large Eddy Simulation of Tropical Convection	Large Eddy Simulation of Momentum and Heat Transport in Urban Canopies: Computational Challenges and Gained Insights	Extracting Various Similarity Formulations from an Extensive Database of Direct and Large-Eddy Simulations of Stably Stratified Flows	
	Luciano Castillo*, Guillermo Araya, Fazle Hussain,	Fotini Chow*, Nikola Marjanovic, Jeffrey Mirocha, Branko Kosovic, Matthew Aitken, Julie Lundquist,	Eric Skillingstad*, Simon de Szoke	Elie Bou-Zeid*, Qi Li, William Anderson, Sue Grimmond	Sukanta Basu*, Ping He	
TS1 MS113 Phase Field Methods for Moving Interfaces in Physics and Biology , Chair(s): Krishna Garikipati						
Torrey Hills A	**Incompressible N-Phase Flows: Physical Formulation and Numerical Algorithm		Phase-Field Modeling for Hydraulic Fracturing in Porous Medium			
	Suchuan Dong*		Sanghyun Lee*			

ROOM	10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM	11:40 AM
TS1 MS908 Applications of Error Estimation and Model Adaptation in Computational Mechanics, Chair(s): L. Chamoin and S. Prudhomme						
Torrey Hills B	Adjoint-Based a Posteriori Error Estimation for Complex Systems	Auxiliary Subspace Error Estimation for Elliptic Problems	Error Estimation Based on Method of Nearby Problems for Finite Element Analysis of Nonlinear Solid Mechanics	Adjoint-Based Error Estimation for Chaotic Flows	Linearization Effects in Goal- Oriented Error Estimates for Nonlinear Problems	
	Simon Tavener*	Jeffrey Ovall*	Takahiro Yamada*	Yukiko Shimizu*, Krzysztof Fidkowski	Corey Bryant*, Serge Prudhomme	

Monday, July 27, Technical Session 2

ROOM	02:00 PM	02:20 PM	02:40 PM	03:00 PM	03:20 PM	03:40 PM
TS2 MS1003 Material Design and Material Optimization, Chair(s): Emilio Silva, Glaucio Paulino						
Harbor G	A Numerical Assessment of Phase-Field Models for Fracture	Two-Scale Design Optimization of Bending Plate and Beam Made of Material with Periodic Micro-Structure	Topology Optimization Procedures with Material Nonlinearities for Reducing Stress Concentrations	Topology Optimization of Cellular Materials with Improved Non-Linear Mechanical Properties	Topology Optimization with Local Stress Constraints: A Level Set with a Polygonal, Finite-Element Approach	
	Ren de Borst*, Stefan May, Clemens Verhoosel, Julien Vignollet	Gengdong Cheng*, Liang xu	Oded Amir*	Josephine Carstensen*, Reza Lotfi, James Guest	Helio Emmendoerfer Jr*, Eduardo A Fancello, Glaucio H Paulino	
TS2 MS202 Flows with Moving Boundaries and Interfaces, Chair(s): Yuri Bazilevs						
Harbor H	**Space-Time Interface Tracking in Fluid Mechanics Computations with Contact Between Moving Solid Surfaces		Optimal Conjugate Heat Transfer Coupling through a Dirichlet-Robin Boundary Condition	Correlation Between Flow Field and Propulsive Efficiency of a Swimming Killifish	Evaluation of Vortex-Blade Interaction Utilizing Flow Feature Detection Techniques	The Fluid-Structure Interaction Technique Specialized to Axially-Symmetric Objects
	Kenji Takizawa*, Tayfun Tezduyar, Austin Buscher, Shohei Asada		Gregory Wagner*, Victor Brunini	Yoichi Ogata*, Takayuki Azama	Nuno Vinha*, David Vallespn, Eusebio Valero, Valentin de Pablo	Ahmad Abawi*, Petr Krysl
TS2 MS001 Minisymposium in Memory of Ted Belytschko: Advances in Meshfree, Particle, XFEM, GFEM, and Related Methods, Chair(s): Marc Alexander Schweitzer						
Harbor I	Mitigation of Zero-Energy Modes in Co-located Particle Methods	Improving MPM	Developing XFEM Methodology to Simulate Fracking in Shale	On a Challenge Prof. Ted Belytschko Announced at USNCCM 1999 Boulder, CO	Modeling Crack Propagation Under Extreme Loading in Mindlin-Reissner Shells Using X-FEM	
	Gordon Johnson*, Stephen Beissel	Deborah Sulsky*, Ming Gong	Zhuo Zhuang*, Zhanli Liu, Dandan Xu, Qinglei Zeng, Tao Wang	Florin Bobaru*	Yannick Jan*, Thomas Elguedj, Bruno Lebl, Alain Combescure	
TS2 MS103 Computational Bioengineering, Chair(s): Mohammad Mofrad						
Bankers Hill	**Non-Linear Coupling of the Drift-Diffusion-Poisson and Stokes Systems for Nanopore Simulations		Computational Modeling of the Spatially Coordinated Mechanosensing in Cell-Microenvironment Interactions	Computational Modeling of Collective Epithelial Cell Migration	Combining Dissipative Particle Dynamics, Finite Element Method and Boundary Element Method to Study Red Blood Cell Diseases	Image-Based Modeling of Skeletal Muscles Based on Strong Form Reproducing Kernel Collocation Method for Hyperelasticity
	Gregor Mitscha-Eibl*, Andreas Buttinger-Kreuzhuber, Gerhard Tulzer, Clemens Heitzinger		Hongyan Yuan*	Xiaowei Zeng*, Liqiang Lin	Zhangli Peng*, Qiang Zhu, Igor Pivkin, Ming Dao, George Karniadakis	Ramya Rao Basava*, J. S. Chen

ROOM	02:00 PM	02:20 PM	02:40 PM	03:00 PM	03:20 PM	03:40 PM
TS2 MS702 Peridynamics and Its Applications, Chair(s): Erkan Oterkus						
Cortez Hill A	Mesoscale Simulations Investigating the Effects of Shock Wave Stability in Granular Materials with Peridynamics	Peridynamics Analysis of Elastic-Plastic Contacts	Peridynamic Modelling of Underwater Shock Response of Marine Composite Structures	Verification and Validation Studies of Ordinary Peridynamic Solid Models		
	John Foster*, Rezwanur Rahman, Amanda Peterson, Tracy Vogler	Sayna Ebrahimi*, Kyriakos Komvopoulos, David Steigmann	Erkan Oterkus*, Cagan Diyaroglu, Dennj De Meo	John Mitchell*		
TS2 MS705 Quasicontinuum and Other Atomistic-to-Continuum Coupling Techniques, Chair(s): C.-S. (David) Chen						
	A Concurrent Parallel Multi-Scale Algorithm for Large 3D Continuum/Atomistic Simulations with Applications to Dislocations	Fully Non-Local QC Investigation of Microstructural Defects and Interfaces	Comparison of Several Staggered Atomistic-to-Continuum Concurrent Coupling Strategies	Multi-Resoulution Molecular Mechanics: A Unified and Consistent Framework for General Finite Element Shape Function	Cauchy-Born ANSYS	
	Fabio Pavia*, B. A. Szajewski, W. A. Curtin,	Dennis Kochmann*, Jeffrey Amelang, Ishan Tembhekar, Gabriela Venturini	Denis Davydov*, Jean-Paul Pelteret, Paul Steinmann	Qingcheng Yang*, Albert To	Ellad Tadmor*, Jiadi Fan, Ryan Elliott	
TS2 MS401 Computational Stability Analysis, Chair(s): Y.B. Yang						
Cortez Hill C	The Buckling Sphere: A Symbiosis of Mechanics and Geometry	Stabilizing the Orthogonal Residual Iterative Procedure with the Normal Flow Technique: Applications to Stability of Arches				
	Herbert A. Mang*, Xin Jia, Stefan Pavlicek	Ricardo Silveira*, Dalilah Pires, Gilney Goncalves, Andra Silva				

ROOM	02:00 PM	02:20 PM	02:40 PM	03:00 PM	03:20 PM	03:40 PM
TS2 MS602 Iterative Methods and Parallel Computing, Chair(s): Ahmed Sameh						
Cove	Fast Solvers for Sparse Matrices Using Low-Rank Approximations	Balancing Domain Decomposition Method with Additive Schwartz Framework for Complex Structures	A Scaled-BDD Preconditioner for the Schur Complement Equation	Testing and Comparing the Augmented Block Cimmino Distributed Solver on Some Class of Applications	Large-Scale Earthquake Response Analysis of Soil and Structure Based on Solid Finite Element Method	
	Hadi Pouransari*, AmirHossein Aminfar, Eric Darve	Tomonori Yamada*, Shinobu Yoshimura	Masao Ogino*	Daniel Ruiz*, Mohamed Zenadi, Olivier Boiteau, Robin Greffeuille, Ronan Guivarch, Iain Duff	Seizo Tanaka*, Tsuyoshi Ichimura, Muneo Hori, Maddegedara Wijerathne	
TS2 MS1013 Modeling and Simulation of 3D Printing and Additive Manufacturing, Chair(s): Albert To						
Golden Hill A	**Experimentally Consistent Process Modeling Techniques for Additive Manufacturing Methods		Feedback Control of Powder Mass Flow Rate in Laser Metal Deposition Processes	A New Heat Source Model for Electron Beam and Substrate Interaction	ICME Research of Additive Manufacturing: Case Study of Ti-6Al-4V	A Void-Mechanics Modeling Procedure for the Mechanical Response of Additive Manufactured Materials
	Wing Kam Liu*, Jacob Smith, Jian Cao		Jennifer Bennett*, Sarah Wolff, Kornel Ehmann, Jian Cao, Greg Hyatt	Wentao Yan*, Jacob Smith, Wenjun Ge, Feng Lin, Wing Liu	Wei Xiong*, Fuyao Yan, Greg Olson	Puikei Cheng*, Jacob Smith, Sarah Wolff, Jian Cae, Wing Kam Liu

ROOM	02:00 PM	02:20 PM	02:40 PM	03:00 PM	03:20 PM	03:40 PM
TS2 MS111 Direct and Inverse Methods for Cardiovascular and Pulmonary Biomechanics, Chair(s): Wolfgang Wall						
Golden Hill B	Inverse Problem of Electro-cardiography From a Multiphysics Perspective	Estimation of Fully Three-Dimensional Properties of Passive Myocardium: A Coupled Inverse Model-Experimental Study	Solution Reduction Approaches for the Variational Estimation of Cardiac Conductivities	Estimating Cardiac Pressure Volume Loop Non-Invasively Using Computational Cardiac Models	Applying Vessel Inlet/Outlet Conditions to Patient-Specific Models Embedded in Cartesian Grids	4D Embryo-Specific Inverse Modeling of Blood Flow in the Chick Embryonic Heart Outflow Tract for Investigating Early Hemodynamic Changes Leading to Congenital Heart Disease
	Jean-Frederic Gerbeau*, Cesare Corrado, Philippe Moireau	Reza Avazmohammadi*, Samarth Raut, John Lesicko, Michael Sacks	Alessandro Veneziani*, Huanhuan Yang, Alessandro Barone, Flavio Fenton	David Nordsletten*, Myrianthi Hadjicharalambous, Liya Asner	Aaron M. Goddard*, H.S. Udaykumar, Sarah C. Vigmostad	Venkat Keshav Chivukula*, Sevan Goenezen, Madeline Midgett, Sandra Rugonyi
TS2 MS303 Recent Progress in Multi-scale Modeling at the Intersection of Ab-initio Methods, Mechanics and Mathematics, Chair(s): Abigail Hunter						
Harbor ABC	Automating the Characterization of Materials Thermodynamics and Kinetics Using Ab Initio-Based Cluster Expansion Hamiltonian Methods with CASM	An Analog of the Plane-Wave Method for Isolated Systems	Adaptive Spectral Finite-Element Based Computational Methods for Large-Scale Electronic Structure Calculations Using Kohn-Sham Density Functional Theory	A Projected Preconditioned Conjugate Gradient Method for Solving Large-Scale Eigenvalue Problems in Materials Simulation	Towards Mechanics Using Quantum-Mechanics	
	Brian Puchala*, John Thomas, Anton Van der Ven	Amartya Banerjee*, Ryan Elliott, Richard James	Phani Motamarri*, Vikram Gavini	Chao Yang*, Eugene Vencharynski, John Pask	Phanish Suryanarayana*	

ROOM	02:00 PM	02:20 PM	02:40 PM	03:00 PM	03:20 PM	03:40 PM
TS2 MS701 Isogeometric Methods, Chair(s): T.J.R. Hughes						
Harbor DEF	**Isogeometric Modeling and Discretization of Contact Problems		Tied Contact for Explicit Dynamics with Isogeometric Analysis	A Comparison of Standard and Iso-Geometric Element for Structural Vibrations	On Locking-Free Methods for Isogeometric Large Deformation Analysis of Geometrically Exact Three-Dimensional Beams	A Critical Comparison of C1-Continuous Methods Applied to the Cahn-Hilliard Equation
	Ekkehard Ramm*, Martina Matzen, Manfred Bischoff		David Benson*, Attila Nagy, Stefan Hartmann	Carlos Felippa*	Kjell Magne Mathisen*, Tore Andreas Helgedagsrud, Siv Bente Raknes, Bjrn Haugen, Knut Morten Okstad, Trond Kvamsdal	Stefan Kaessmair*, Paul Steinmann
TS2 MS804 Computational Modeling of Contact and Embedded Interfaces, Chair(s): Jerome Solberg						
Hillcrest A	Computational Mechanics Applied to the Simulation of Fabrics	Nitsches Method for Helmholtz-Type Variational Problems with Embedded Interface	A Localized Version of Mortar Method for Treatment of Three-Dimensional Non-Matching Interfaces	Energy-Conserving Variable-Node Interface Elements for Interaction Analysis	Stability Analysis of Arches on an Elastic Foundation	
	Paulo M. Pimenta*, Alfredo Gay Neto, Peter Wriggers	Zilong Zou*, Isaac Harari, Wilkins Aquino	Yeo-ul Song*, Sung-Kie Youn, Kwang-Chun Park	Jungdo Kim*, Seyoung Im, K. C. Park	Christianne Nogueira*, Ricardo Silveira, Paulo Goncalves	
TS2 MS413 Modeling Dynamic Response of Heterogeneous Materials, Chair(s): Caglar Oskay						
Hillcrest B	Discrete and Continuum Modeling of Wave Propagation in Chiral Lattices with Local Resonators	Multi-Scale, Transient Dynamic Analysis of Heterogeneous Materials Using Computational Homogenization	A Multi-Temporal Scale Approach to the Fatigue Life Prediction of Rubber	Study of Effects of Void Size and Shock Strength on Shock Initiation due to Void Collapse in Heterogeneous Energetic Materials		
	Luigi Gambarotta*, Andrea Bacigalupo,	Ashwin Sridhar*, Varvara Kouznetsova, Marc Geers	Shogo Wada*, Dong Qian	Sidhartha Roy*, Oishik Sen, Nirmal Kumar Rai, H. S. Udaykumar		

ROOM	02:00 PM	02:20 PM	02:40 PM	03:00 PM	03:20 PM	03:40 PM
TS2 MS301 Multiscale Computational Homogenization for Bridging Scales in the Mechanics and Physics of Complex Materials, Chair(s): B. Mercer, C. Sandstrom						
Hillcrest C	Mechanics of Structure Genome	Multi-Scale Analysis of Electrical Contact Resistance for Resistance Spot Welding Simulation	Multi-Scale Simulation of Polymer Nanocomposites: Elastoplastic Approach	Numerical Material Testing for FRP with a Finite Strain Viscoelastic-Viscoplastic Model	On the Homogenization of Fluid-Filled Deformable Porous Media	
	Wenbin Yu*	Hiroyuki Kuramae*, Riku Kusumoto, Junya Yamada, Tomoya Niho, Tomoyoshi Horie	Hyunseong Shin*, Maenghyo Cho, Junghyun Ryu	Seishiro Matsubara*, Kenjiro Terada, ,	Carl Sandstrm*	
TS2 MS203 International Symposium of High-order Methods for Computational Fluid Dynamics, Chair(s): Krzysztof Fidkowski						
Hillcrest D	An Hp-Adaptive Anisotropic Meshing Technique for Convection-Diffusion Problems	A High-Order 3D Flow Solver for Compressible Viscous Flows on Coupled Rotating/Stationary Domains Using Spectral Difference Method and a Novel Sliding-Mesh Interface Approach	A Scalar Limiting Algorithm for High-Order Methods	A High-Order Arbitrary Lagrangian-Eulerian Finite-Volume Method for Hyperbolic Conservation Laws	RANS and Detached-Eddy Simulations of Wingtip Vortices Around NACA0012 Wing by a High-Order Accurate Flux Reconstruction Approach	The Flux Reconstruction Method for Solving Unsteady Incompressible Navier-Stokes Equations with Implicit Time Stepping on Unstructured Grids
	Georg May*, Aravind Balan, Michael Woopen	Bin Zhang*, Chunlei Liang,	Eurielle Bossennec*, Guido Lodato, Luc Vervisch	Marc Charest*, Jozsef Bakosi, Thomas Canfield, Alex Long, Nathaniel Morgan, Jacob Waltz, John Wohlbier	Koji Miyaji*	Christopher Cox*, Chunlei Liang, Michael Plesniak

ROOM	02:00 PM	02:20 PM	02:40 PM	03:00 PM	03:20 PM	03:40 PM
TS2 MS502 Immersed/embedded/fictitious Domain Methods and Their Application in Analysis and Optimization, Chair(s): Fehmi Cirak						
Mission Beach A	Immerso-geometric Analysis: The Role of Geometric Fidelity in Immersed Domain Finite Element Methods	Immerso-geometric Analysis of Turbulent Flow Over Complex Geometries	Higher-Order Accurate Integration of Three-Dimensional Geometries Defined by Level-Sets	An Efficient and Accurate Integration Scheme for Fictitious Domain Methods Based on Levelsets and Anisotropic Meshing	Shape and Topology Optimization via the Level Set Method	
	Dominik Schillinger*, Vasco Varduhn, David Kamensky, Chenglong Wang, Sean Wasion, Bryann Sotomayor-Rinaldi, Dominik Schillinger, Ming-Chen Hsu, Fei Xu	Fei Xu*, Vasco Varduhn, David Kamensky, Chenglong Wang, Sean Wasion, Bryann Sotomayor-Rinaldi, Dominik Schillinger, Ming-Chen Hsu	Thomas-Peter Fries*	Gregory Legrain*, Nicolas Mos	Franois Jouve*	
TS2 MS403 Numerical Modeling and Computational Methods of Impact and Blast Problems, Chair(s): Howie Fang						
Mission Beach B	**Numerical Modeling of Cold-Formed Steel Stud Walls with Conventional Stud-to-Track Connections Subjected to Blast Loads		Particle Blast Method (PBM) for the Simulation of Blast Loading	Numerical Modeling of a Glass Curtain Wall Subjected to Low-Level Blast Loads	Dynamic Fracture Characteristics of Metal Plate Under Blast Loading	
	Matthew Whelan*, Michael Connor, David Weggel, Adam Ralston		Hailong Teng*	David Weggel*, Adam Ralston, Matthew Whelan, Howie Fang	Yan Duan*, Hui Lan Ren, Xiang Zhao Xu	
TS2 MS506 Advances in Computational Methods for Inverse Problems, Chair(s): Paul Barbone and Wilkins Aquino						
Mission Beach C	Theory and Algorithms for PDE-Constrained Optimization Under Uncertainty	An Operator-Based Framework for Inverse Problems	Inexact Full-Space Methods for Simulation-Based Inverse Problems and Large-Scale Optimization	Residual-Based Stabilized Formulations for the Solution of Inverse Elliptic PDEs		
	Drew Kouri*	Timothy Walsh*	Denis Ridzal*	Mohit Tyagi*, Assad Oberai, Paul Barbone		
TS2 MS906 Calibration, Validation, and Bayesian Approaches in Predictive Modeling and Simulation, Chair(s): Paul T. Bauman						
Ocean Beach	Adaptive Surrogate Modeling for Bayesian Parameter Estimation of RANS Models	Calibration and Forward Uncertainty Propagation of Turbulence Models for Coarse-Grid, Large-Eddy Simulation	Accurate Estimation of Probability of Failure in Large-Scale Stochastic Structural Simulations	Dynamically Coupled Fluid-Structure Interaction and Damage Model for Fatigue Prediction in Composite Structures	Inflow Estimation for a 1D Arterial Network Model via Ensemble Kalman Filter	
	Serge Prudhomme*, Corey Bryant	Jeremy Templeton*	Kundan Goswami*, Sonjoy Das, Biswa N. Datta	Artem Korobenko*, X.Deng, J. Yan, Yuri Bazilevs	Andrea Arnold*, Christina Battista, Mette Olufsen	

ROOM	02:00 PM	02:20 PM	02:40 PM	03:00 PM	03:20 PM	03:40 PM
TS2 MS206 Numerical Solution of the Incompressible Navier Stokes Equations: Old and New Challenges, Chair(s): Alessandro Veneziani						
Pier	Natural Vorticity Boundary Conditions on Solid Walls and Application to Velocity-Vorticity Methods for Navier-Stokes	Algebraic Multigrid Preconditioners for Q2-Q1 Discretizations of the Incompressible Navier-Stokes Equations	Some Nodal-Continuous Elements for Solving Non H1 Space Very Weak Solutions of Stokes Equations and Maxwell Equations	Issues in Parallel CFD Execution on Clouds, Grids and Clusters	Axial Green's Function Method for Unsteady Viscous Flows	Non-Linear Waves of Viscoelastic Liquid Curved Jets in the Giesekus Model
	Leo Rebholz*	Ray Tuminaro*	Huoyuan Duan*	Vaidy Sunderam*	Junhong Jo*, Wanho Lee, Do Wan Kim	Abdullah Alsharif*
TS2 MS304 Concurrent Multi-length Scale Modeling: From Finite Elements to Atoms and Electrons, Chair(s): Qing Peng						
Promenade A	Concurrent Multiscale Modeling: From Quantum to Continuum	Brittle Intergranular Fracture Frustrated by Intermittent Dislocation Emission	Coupled Atomistic-Continuum Framework of Developing Constitutive Relations of Crack Propagation	Multi-Scale Modeling of Strength and Toughness of 3D IC Intermetallic Micro Bumps	Concurrent Multiscale Modeling: From Quantum to Continuum	
	W. A. Curtin*	Michael Demkowicz*, Guoqiang Xu	Jiaxi Zhang*, Subhendu Chakraborty, Somnath Ghosh	Chi-Hua Yu*, Chih-Chuen Lin, Chuin-Shan Chen	W. A. Curtin*	
TS2 MS708 Symposium on Trends in Unstructured Mesh Generation - MeshTrends 10, Chair(s): Matthew Staten						
Promenade B	Bulk Point Insertion Using a Smooth Frame Field for Hex-Dominant Meshing	Automatic Hexahedral Meshing of Thin Regions connected to Hex-Dominant Meshes	3D Frame Fields: A Tool for Hexahedral Meshing	Automatic Hexahedral Mesh Adaptation for Numerical Design	Parallel Mesh Optimization for Grid-Based Hex Meshes	HexJaal: A Bounded-Distortion Hex Mesh Generator Using Polycubes Method
	Paul-Emile Bernard*, Jean-François Remacle	Nicolas kowalski*, Jean-François Remacle, Paul Emile Bernard	Franck Ledoux*	Nicolas Le Goff*	Steven Owen*	Chaman Singh Verma Krishnan Suresh*
TS2 MS406 Computational Fracture Mechanics, Chair(s): Christian Linder						
Solana Beach A	Evaluation of Peridynamic Models for Damage and Failure in FRCs	Model Order Reduction for Meshfree Analysis of Fracture Problems	3D Numerical Modeling with E-FEM Method of Induced Fractures Around Drifts Due to Excavation	Cohesive Dynamics for Quasibrittle Fracture		
	Yenan Wang*, Guanfeng Zhang, Florin Bobaru	Qizhi He*, Camille Marodon, J.S. Chen	Paul Hause* , Jean-Baptiste Colliat, Jian-Fu Shao, Darius Sayedi	Eyad Said*, Robert Lipton		

ROOM	02:00 PM	02:20 PM	02:40 PM	03:00 PM	03:20 PM	03:40 PM
TS2 MS208 Large Eddy and Direct Numerical Simulations with Geophysical Applications, Chair(s): Andres Tejada-Martinez						
Solana Beach B	LES-SOMAR: An Adaptive Framework for Geophysical Simulations Across Multiple Scales	Direct Numerical Simulation of Transport and Mixing in Breaking Internal Waves on Slopes	Turbulence During the Generation of Internal Waves at Rough, Underwater Topography	Enhanced Turbulent Mixing in the Upper Pacific Equatorial Ocean	On the Prediction of Turbulent Diapycnal Mixing in Stably Stratified Geophysical Flows	
	Alberto Scotti*, Edward Santilli, Sutanu Sarkar, Vamsi Chalamalla	Oliver Fringer*, Robert Arthur	Sutanu Sarkar*, Masoud Jalali	Hieu Pham*, Sutanu Sarkar, Kraig Winters	Subhas Karan Venayagamoorthy*	
TS2 MS113 Phase Field Methods for Moving Interfaces in Physics and Biology , Chair(s): Victor Calo						
Torrey Hills A	Grain Boundary Faceting in the Presence of Junction Dislocations: A Phase Field Treatment	Phase-Field Modeling of the \Alpha-\Gammaamma Phase Transformation of RDX	Quantitative, Elastoplastic Phase-Field Model for Solid State Phase Transformation Under Stress and Temperature Gradients	Large-Scale Simulation for Self-Assembly of Crystalline Nanostructures with High Performance Computing	Phase-Field Simulations of Eutectic Alloy Solidification into Templates for Photonic Metamaterials	
	Fadi Abdeljawad*, Douglas Medlin, Jonathan Zimmerman, Khalid Hattar, Stephen Foiles	Rahul .*, Suvranu De	San-Qiang Shi*	Zhen Guan*, John Lowengrub, Sudhakar Pamidighantam, Hadrian Djohari	Larry Aagesen*, Jinwoo Kim, Ali Ramazani, Paul Braun, Katsuyo Thornton	
TS2 MS908 Applications of Error Estimation and Model Adaptation in Computational Mechanics, Chair(s): M. Laforest and S. Prudhomme						
Torrey Hills B	Verification and Effectivity of PGD Computational Techniques	Model Order Reduction and Error Estimation for Variational Inequalities and Optimal Control	Fully Localized a Posteriori Error Estimation for Port Reduced Static Condensation Procedures	Control of the Multi-Scale Finite Element Method Using a Posteriori Error Estimation and Adaptive Strategy	Local and Pointwise Error Estimation Based on the Variational Multi-Scale Theory	
	Pierre Ladeveze*, Pierre-Eric Allier, Ludovic Chamoin, David Neron	Karen Veroy*, Eduard Bader, Martin Grepl, Mark Kærcher, Zhenying Zhang	Kathrin Smetana*, Anthony T Patera	Ludovic Chamoin*, Frédéric Legoll, Claude Le Bris	Guillermo Hauke*, Diego Irisarri	

Monday, July 27, Technical Session 3

ROOM	04:30 PM	04:50 PM	05:10 PM	05:30 PM	05:50 PM	06:10 PM
TS3 MS1003 Material Design and Material Optimization, Chair(s): Glaucio Paulino, Ekkehard Ramm						
Harbor G	**Multi-Scale Topology Optimization For Hyperelastic Composites	Optimal Nanostructures for Li-Ion Battery Anode Applications	Mechanical Properties of Organic Electronic Materials: A Coarse-Grained Molecular Dynamics Study	Coupling of Multi-Resolution Continuum Theory and Dislocation Dynamics for Physically Informed Component Scale Simulation	Cellular Materials that Exhibit Phase Transformations	
	Junji Kato*	Sarah Mitchell*, Michael Ortiz	Samuel Root*, Darren Lipomi, Gaurav Arya	Orion L. Kafka*, Jacob Smith, John A. Moore, Miguel Bessa, Tarek Hatem, Wing Kam Liu	Sara Rodriguez*, David Restrepo, Niles Mankame, Juan Gomez, Pablo Zavattieri	
TS3 MS803 Fluid-Structure Interaction, Chair(s): Kenji Takizawa						
Harbor H	**Fluid-Structure Interaction of Wind Turbines: Recent Results and New Directions	A Stabilized Explicit Scheme for Coupling Fluid-Structure Interactions	Fluid-Structure Interaction Analysis of a Disk-Gap-Band Parachute in Compressible-Flow Regime	PreCICE - A Flexible and Versatile Coupling Library	Numerical Simulation of Seepage-Induced Erosion of Soils by Solving the Darcy/Navier-Stokes Coupled Flows	
	Yuri Bazilevs*	Yue Yu*	Taro Kanai*, Kenji Takizawa, Tayfun Tezduyar	Florian Lindner*, Miriam Mehl, Benjamin Uekermann	Kazunori Fujisawa*	
TS3 MS001 Minisymposium in Memory of Ted Belytschko: Advances in Meshfree, Particle, XFEM, GFEM, and Related Methods, Chair(s): D. Sulusky						
Harbor I	**Three-Dimensional Crack Nucleation, Growth and Coalescence Using the Thick Level Set Approach to Fracture	Dislocation Dynamics via the Extended Finite Element Method	Development of the Particle Difference Method for Solving Dynamic Crack Propagation Problems	Extended Finite Element Method with Global Enrichment		
	Nicolas Moes*, Alexis Salzman, Nicolas Chevaugeon	Jay Oswald*	Sang-Ho Lee*, Kyeong-Hwan Kim, Young-Choel Yoon	Konstantinos Agathos*, Eleni Chatzi, Stphane P. A. Bordas, Demosthenes Talaslidis		

ROOM	04:30 PM	04:50 PM	05:10 PM	05:30 PM	05:50 PM	06:10 PM
TS3 MS103 Computational Bioengineering, Chair(s): Yusheng Feng						
Bankers Hill	**Active Muscle Response on Occupant-Knee Airbag Interaction in Automotive Impacts		Stochastic Characterization of Geometrical and Material Uncertainties in Simulation of Brain Mechanics		A Local Level Set-Based Approach for Modelling Electrosurgical Tissue Cutting	
	Matthew Panzer*, Bingbing Nie, Jeff Crandall		Therence Temfack*, Sonjoy Das,	Venkata S. Arikatla*, Zhongqing Han, Suvarnu De		
TS3 MS705 Quasicontinuum and Other Atomistic-to-Continuum Coupling Techniques, Chair(s): Jaime Marian						
Cortez Hill B	Non-Reflection Scheme for Atomistic-to-Continuum Coupling	Predicting the Rate of Dislocation-Precipitate Interactions with Atomistic Simulations	A Mesoscopic Model to Describe Rate-Independent Hysteresis in Filled Rubber	A Quasi-Harmonic Based Multi-Scale Method to Model Intrinsic Dissipation in Solids	Concurrent Multi-Scale Modelling of Amorphous Materials	
	Chuin-Shan "David" Chen*, Chung-Shuo Lee, Yan-Yu Chen	Sepehr Saroukhani*, Linh Nguyen, Chandra Singh, Kelvin Leung, Derek Warner	Thomas Hudson*, Frederic Legoll, Tony Lelievre	Kumar Kunal*, Narayana Aluru	Vincent Tan*	
TS3 MS402 Numerical Methods for Hydraulic Fracture Simulation, Chair(s): Dakshina Valiveti/Peter Gordon						
Cortez Hill C	Simulation of 3-D Hydraulic Fracture Propagation and Coalescence	Coupled Fluid-Flow/Mechanical/Fracture Simulations of Non-Planar Hydraulic Fracture Propagation	Dynamic Simulation of Hydraulic Fracturing Using XFEM	Spacetime Discontinuous Galerkin Finite Element Method and an Interfacial Damage Model for Hydraulic and Compressive Fracture Simulations	An Improved Enriched Finite Element Method for Hydraulic Fracturing Propagation	
	C. Armando Duarte*, Piyush Gupta	Piyush Gupta*, Armando Duarte	Matin Parchei Esfahani*, Robert Gracie	Omid Omidi*, Reza Abedi, Saeid Enayatpour, Ian McNamara, Robert Haber	Denis Klimenko*, Arash Dahi Taleghani	
TS3 MS602 Iterative Methods and Parallel Computing, Chair(s): Hiroshi Kawai						
Cove	The Inverse Fast Multipole Method as an Efficient Preconditioner for Dense Linear Systems	Nonlinear Iterative Analysis Using Reproducing Kernel Collocation Method	A Block Variant of the COCG Method for Generalized Shifted Linear Systems with Multiple Right-Hand Sides			
	Pieter Coulier*, Hadi Pouransari, Eric Darve	Judy Yang*	Tomohiro Sogabe*, Shao-Liang Zhang			

ROOM	04:30 PM	04:50 PM	05:10 PM	05:30 PM	05:50 PM	06:10 PM
TS3 MS1013 Modeling and Simulation of 3D Printing and Additive Manufacturing, Chair(s): Albert To						
Golden Hill A	Design of Experiments for Uncertainty Quantification of FEA Modeling in DMLS Additive Manufacturing of Ti-6Al-4V	Finite Element Modeling and Validation of Thermal-Mechanical Behavior of Additive Manufacturing of Ti-6Al-4V	Integrated Multiscale Simulation Approach to Laser Material Interaction	Modelling and Simulation of Metal Deposition on a Ti-6al-4v Plate		
	Li Ma*, Jeffrey Fong, Brandon Lane, Shawn Moylan, Lyle Levine	Albert To*, Qingcheng Yang	Dong Qian*, Mohammad Karim	Andreas Lundbck*, Robert Pederson, Magnus Hrnqvist, Craig Brice, Axel Steuwer, Almir Heralic, Thomas Buslaps, Lars-Erik Lindgren		
TS3 MS111 Direct and Inverse Methods for Cardiovascular and Pulmonary Biomechanics, Chair(s): Alberto Figueroa						
Golden Hill B	Coupling of 3D and 1D Transport Models to Predict Particle Deposition in the Pulmonary Airways	A Graphical System for Implementing Lumped Parameter Vascular Boundary Conditions: From Pen and Paper to the Super-computer in Five Minutes	An Inverse Modeling Framework for Determination of Heart Valves' Mechanical Properties	On the Effects of Leaflet Microstructure and Constitutive Model on the Closing Behavior of the Mitral Valve	Hemolysis Modeling in the Context of Benchmark Rotary Pumps	Viscoplastic and Thixotropic Effects of Blood Rheology to Arterial Flow
	Jessica M. Oakes*, Cline Grandmont, Shawn C. Shadden, Irene E. Vignon-Clementel	Christopher J. Arthurs*, Rostislav Khlebnikov, Kevin D. Lau, C. Alberto Figueroa	Ankush Aggarwal*, Michael Sacks	Chung-Hao Lee*, Michael Sacks	Marek Behr*, Lutz Pauli, Stefan Haler	Antony Beris*, Alex Apostolidis, John Fillenwarth, Adam Moyer

ROOM	04:30 PM	04:50 PM	05:10 PM	05:30 PM	05:50 PM	06:10 PM
TS3 MS303 Recent Progress in Multi-scale Modeling at the Intersection of Ab-initio Methods, Mechanics and Mathematics, Chair(s): Amartya Banerjee						
Harbor ABC	Energetics and Kinetics of the Vacancy Phase-Field-Crystal Model	Investigation of Deformation Twins Using a DFT-Informed 3D-Phase Field Dislocation Dynamics (PFDD) Model	Computational Studies of Strain-Induced Structural Transformations in 2D Transition Metal Dichalcogenides	Ideal Strength and Deformation Defects of Advanced Alloys	Environment Embedded Photoisomerization Model of Diarylethene	
	David Montiel*, Katsuyo Thornton	Abigail Hunter*, Irene Beyerlein	Joel Berry*, Songsong Zhou, Jian Han, Shuyang Dai, David J. Srolovitz, Mikko Haataja	Liang Qi*	Muyoung Kim*, Jung-Hoon Yun, Maenghyo Cho	
TS3 MS701 Isogeometric Methods, Chair(s): A. Reali						
Harbor DEF	**A Natural Framework for Isogeometric Fluid-Structure-Interaction: Coupling BEM and Shell Models		A Shear-Deformable, Rotation-Free Isogeometric Shell Formulation	Patch-Coupling with the Mortar Method in Isogeometric ReissnerMindlin Shell Analysis	A Posteriori Error Estimation Based on a Serendipity Pairing of Approximation Spaces in Isogeometric Methods	Free Vibration Analysis of Thick Plates with Isogeometric Approach
	Josef Kiendl*, Luca Heltai, Alessandro Reali, Antonio DeSimone		Bastian Oesterle*, Ekkehard Ramm, Manfred Bischoff	Wolfgang Dornisch*, Ralf Mller, Sven Klinkel	Trond Kvamsdal*, Mukesh Kumar, Kjetil A. Johannessen	Wei Wang*, Howie Fang, Xiaoxiao Du, Gang Zhao
TS3 MS802 Immersed and Advanced Fluid-Structure Interaction Computational Strategies, Chair(s): Gil, A.J.						
Hillcrest A	An Adaptive and Implicit Immersed Boundary Method for Cardiovascular Device Modeling	Enhancing the Efficiency and Robustness of Monolithic Fluid-Structure Interaction Solvers	A Parallel and Monolithic Approach to FSI Combining Finite Elements and Finite Volumes	Immersed Fluid-Structure Interaction Strategies for Deformable and Rigid Bodies	Fluid-Structure Coupling Methods for Blast Loading on Thin Shells	Fluid-Structure Interaction Using Immersed Boundaries and Geometrically-Exact Beam Theory with Contact
	Amneet Pal Singh Bhalla*, Boyce Griffith	Matthias Mayr*, Wolfgang A. Wall, Michael W. Gee	Rolf Krause*, Johannes Steiner	Christian Hesch*	Jesse Thomas*, Edward Love, Kevin Ruggirello, Martin Heinstein, William Rider	Luiz Couto*, Paulo M. Pimenta, Henrique C. Gomes, Alfredo Gay Neto

ROOM	04:30 PM	04:50 PM	05:10 PM	05:30 PM	05:50 PM	06:10 PM
TS3 MS410 Mathematical and Numerical Modeling of Degradation of Materials and Structures, Chair(s): Kalyana Nakshatrala						
Hillcrest B	Damage Phenomenon in Solid Propellants - Computational Aspects	A Moore-Penrose Continuation Method Based on a Schur Complement Approach for Non-Linear Finite Element Bifurcation Problems	Cyclic Plastic Hinges with Degradation of Stiffness and Strength	Coherent Interface Elasticity Theory Accounting for Damage	Characterizing Damage Using Peridynamics and Digital Image Correlation	
	Sebnem Ozupek*, Birkan Tunc	Sophie Leger*, Jean Deteix, Andr Fortin	Lasse Tidemann*, Steen Krenk	Ali Esmaeili*, Ali Javili, Paul Steinmann	Johannes Conradie*, Daniel Turner, Thorsten Becker	
TS3 MS301 Multiscale Computational Homogenization for Bridging Scales in the Mechanics and Physics of Complex Materials, Chair(s): V. Kouznetsova						
Hillcrest C	Effect of the Spatial Distribution of Voids on the Thermo-Mechanical Properties of Porous Media	On an Application of a Continuum Homogenization Theory to Materials Under High-Frequency Dynamic Loading				
	Ji-Su Kim*, Sang-Yeop Chung, Tong-Seok Han	Brian Mercer*, Panayiotis Papadopoulos, Kranti Mandadapu				
TS3 MS203 International Symposium of High-order Methods for Computational Fluid Dynamics, Chair(s): Per-Olof Persson						
Hillcrest D	**A Comparison of Hybrid and Standard Discontinuous Galerkin Methods for Output-Based Adaptive Simulations on Deformable Domains		Simulating Unsteady Flow Over a NACA0021 Airfoil in Deep Stall with PyFR	Adaptation Strategies for Discontinuous Galerkin by Means of Tau-Estimation		
	Krzysztof Fidkowski*		Jin Seok Park*, Freddie Witherden, Peter Vincent	Moritz Kompenhans*, Gonzalo Rubio, Esteban Ferrer, Eusebio Valero		

ROOM	04:30 PM	04:50 PM	05:10 PM	05:30 PM	05:50 PM	06:10 PM
TS3 MS502 Immersed/embedded/fictitious Domain Methods and Their Application in Analysis and Optimization, Chair(s): Ming-Chen Hsu						
Mission Beach A	**The Finite Cell Method: Basic Principles and Recent Progress	The Finite Cell Method for Arbitrary Tetrahedral Meshes: Basic Principles	Adaptively Weighted Numerical Integration in the Finite Cell Method	Condition Number Estimation and Improvement Strategies for the Isogeometric Finite Cell Method		
	Ernst Rank*, Tino Bog, Laszlo Kudela, Stefan Kollmannsberger, Nils Zander	Sascha Duczek*, Ulrich Gabbert	Vaidyanathan Thiagarajan*, Vadim Shapiro	Frits de Prenter*, Wing-Hin Wong, Clemens Verhoosel, Gertjan van Zwieten, Harald van Brummelen		
TS3 MS403 Numerical Modeling and Computational Methods of Impact and Blast Problems, Chair(s): Matthew Whelan						
Mission Beach B	The Mechanical Behaviour of New Hybrid Sandwich Structures Based on Corrugated-Core and Fibre Metal Laminates Under Low-Velocity Impact Loading	Damage Evolution of Fibre Metal Laminates Under Low Velocity Impact Loading: Experimental and Modeling	Ballistic Impact Performance Evaluation of Advanced Combat Helmet Using Numerical Methods	Numerical Comparison and Optimization of Functionally-Graded Structures Under Multiple Impact Loads	The Tactics for Hypervelocity Impact Simulations with Use of Smoothed Particle Hydrodynamics Method	Cavitation Pitting: Using the Target Material as a Sensor
	Tawan Boonkong*, Wesley James Cantwell, Zhongwei Guan, Alia Ruzanna Aziz	Yu E Ma*, Bo Wang	Emre Palta*, Hongbing Fang, David C. Weggel	Guangyao Li*, Guangyong Sun, Zheshuo Zhang, Jianguang Fang, Qing Li	Zhenfei Song*, Shicao Zhao, Jianheng Zhao	Samir Chandra Roy*, Marc Fivel, Jean-Pierre Franc, Christian Pellone, Marc Verdier

ROOM	04:30 PM	04:50 PM	05:10 PM	05:30 PM	05:50 PM	06:10 PM
TS3 MS506 Advances in Computational Methods for Inverse Problems, Chair(s): Assad Oberai and Paul Barbone						
Mission Beach C	Hyperelastic Elasto-graphy in a Large-Scale Bayesian Inversion Setting	Early Detection of Breast Cancer Through an Inverse Problem Approach to Stiffness Mapping: Preliminary Results from Tissue Phantom Experiments	Discontinuous Galerkin Methods for Inverse Potential Problems	An Error in Constitutive Equations Approach for Elasticity Imaging Using Ultrasound Data	A Stabilized Lagrange Multiplier Formulation for an Inverse Elasticity Problem Formulated as a PDE Constrained Optimization Problem	Analytical and Numerical Studies on the Modified Error in Constitutive Equations Approach for Inverse Elastodynamics
	Jack S. Hale*, Patrick E. Farrell, Stephane P. A. Bordas	Lorraine Olson*, Robert Throne, Adam Nolte, Allison Crump, Wanli He, Michael Jones, Caitlin Douglas, Matthew Conrad, Emily Cottingham,	Olalekan Babaniyi*, Assad Oberai, Paul Barbone	Susanta Ghosh*, Manuel Diaz, Zilong Zou, Mark Palmeri, Mahdi Bayat, Mostafa Fatemi, Wilkins Aquino	Daniel Seidl*, Paul Barbone, Assad Oberai	Wilkins Aquino*, Marc Bonnet,
TS3 MS906 Calibration, Validation, and Bayesian Approaches in Predictive Modeling and Simulation, Chair(s): Damon McDougal						
Ocean Beach	Measure-Theoretic Parameter Estimation for Hydrodynamic Models	Bayesian Calibration & Validation of Soft Tissue Constitutive Models	A Bayesian Approach to Selecting Hyperelastic Constitutive Models of Soft Tissue	Bayesian Calibration of Reaction Rate Model Parameters in Reacting Multiphase Flow Simulations for Advanced Coal Gasifier Technology Development		
	Lindley Graham*, Troy Butler, Clint Dawson	Kumar Vemaganti*, Sandeep Madireddy, Bhargava Sista, Kumar Vemaganti	Sandeep Madireddy*, Bhargava Sista, Kumar Vemaganti	Mehrdad Shahnam*, Aytekin GEL, Aun K. Subramanyan, Jordan Musser, Jean-Francois Dietiker		

ROOM	04:30 PM	04:50 PM	05:10 PM	05:30 PM	05:50 PM	06:10 PM
TS3 MS204 Simulation Techniques for Particulate Flow Problems, Chair(s): TBA						
Pier	DEM Simulation of the Dry and Weakly Wetted Bulk Flow on a Pelletizing Table	Stochastic Vortex Structure Method for Simulation of Interacting Particles in Turbulent Flows	CFD-DEM Simulations of Sediment Transport Based on a Novel Coarse-Graining Algorithm			
	Anton Gladkyy*, Holger Lieberwirth, Ruediger Schwarze	Jeffrey Marshall*, Kyle Sala, Farzad Faraji Dizaji	Rui Sun*, Heng Xiao			
TS3 MS304 Concurrent Multi-length Scale Modeling: From Finite Elements to Atoms and Electrons, Chair(s): Qing Peng, Shaofan Li, Suvranu De						
Promenade A	Smart Use of Density Functional Theory Calculations to Drive Newtonian Dynamics	An Atomistic Field Theory for Ferroelectric Nanostructure Modeling	Multi-Scale Modeling of the Nanoindentation of Bcc Iron Using QCDFT Method			
	Reese Jones Jones*, Michael Shaughnessy	Meng Li*, Xiaowei Zeng	Qing Peng*, Suvranu De			
TS3 MS708 Symposium on Trends in Unstructured Mesh Generation - MeshTrends 10, Chair(s): Franck Ledoux						
Promenade B	Boundary Layer Mesh Generation on Arbitrary Geometries	Array-Based Distributed Modifiable Mesh Structure	A Parallel Framework for Multiobjective Mesh Optimization			
	Romain Aubry*, Bilge Kaan Karamete, Eric L. Mestreau, Saikat Dey	Dan Ibanez*, Mark Shephard	Suzanne Shontz*			
TS3 MS406 Computational Fracture Mechanics, Chair(s): Christian Linder						
Solana Beach A	Highly Scalable Framework for Fully Coupled Multi-Scale Simulation of Failure in Heterogeneous Layers	Lattice Simulation for Evaluating Fracture Properties of Brick-Mortar Interfaces Using Four-Point Bending Tests	On Micromechanics Associated with Crack Growth in Quasi-Brittle Materials	Three-Dimensional Concrete Crack Propagation Using Transition from Continuous Damage to XFEM		
	Matthew Mosby*, Karel Matous	Amir H. Mohammadipour*, Reza Mousavi, Kaspar Willam	Mohamed Chabaat*, Mokhtar Touati, ,	Simon-Nicolas Roth*, Azzeddine Soulamani, Pierre Lger		

ROOM	04:30 PM	04:50 PM	05:10 PM	05:30 PM	05:50 PM	06:10 PM
TS3 MS208 Large Eddy and Direct Numerical Simulations with Geophysical Applications, Chair(s): Lian Shen						
Solana Beach B	Turbulent Bubbly Flow Under Breaking Water Waves	3D Dynamics of the Near-Surface Layer of the Ocean: Field and Computational Experiments	Large Eddy Simulations of Reactive Tracers in the Oceanic Mixed Layer	A K-Profile Parameterization of Vertical Mixing Induced by Langmuir Turbulence in Shallow Water	Turbulent Bubbly Flow Under Breaking Water Waves	
	James T Kirby*, Morteza Derakhti, ,	Alexander Soloviev*, Cayla Dean, Michael McGauley	Peter Hamlington*, Katherine Smith, Baylor Fox-Kemper, Nikki Lovenduski	Cigdem Akan*, Nityanand Sinha, Andres E. Tejada-Martinez,	James T Kirby*, Morteza Derakhti, ,	
TS3 MS113 Phase Field Methods for Moving Interfaces in Physics and Biology , Chair(s): Hector Gomez						
Torrey Hills A	High-Performance Phase-Field Modeling	A Massively Parallel Terascale Matrix-Free Computational Framework for Phase Field Modeling	Quantifying the Effects of Noise on Spinodal-Decomposition: Massively Parallel Framework and a Variational Multiscale Treatment	An MBO Scheme on Graphs for Classification and Image Processing		
	Victor Calo*, Philippe Vignal, Adel Sarmiento, Adriano Cortes, Lisandro Dalcin, Nathan Collier	Shiva Rudraraju*	Spencer Pfeifer*, Victor Calo, Baskar Ganapathysubramanian	Ekaterina Merkurjev*, Andrea Bertozzi, Tijana Kostic, Allon Percus, Arjuna Flennner, Cristina Garcia-Cardona		
TS3 MS908 Applications of Error Estimation and Model Adaptation in Computational Mechanics, Chair(s): L. Chamoin and S. Prudhomme						
Torrey Hills B	**Adjoint-Based a Posteriori Error Estimation and Uncertainty Quantification for Shock-Hydro-dynamic Applications		Combined Uncertainty and A-Posteriori Error Bound Estimates for General CFD Calculations	Strategies for Mesh Adaptivity in the Context of Bayesian Inverse Problems	Estimation of Error for Coarse-Grained Models of Atomic Systems	
	Tim Wildey*, John Shadid, Eric Cyr		Timothy Barth*	Jayanth Jagalur Mohan*, Youssef Marzouk	Danial Faghghi*, Kathryn Farrell, J. Tinsley Oden	

Plenary Speaker, Tuesday, July 28, 2015

9:00 – 9:45 am, Harbor Ballroom

Space–Time Computational FSI Techniques

Tayfun Tezduyar, Rice University

Abstract: The presentation will focus on the core and special Space–Time (ST) FSI techniques introduced to bring solutions to some of the most challenging FSI problems, including spacecraft parachute FSI and flapping-wing aerodynamics of an actual locust. The ingredients of the core ST FSI technique include the ST interface-tracking (moving-mesh) method, appropriate stabilization parameters, robust mesh moving methods, temporal NURBS basis functions, and the variational multiscale (VMS) version of the ST formulation. Special ST FSI techniques target the computational challenges involved in specific classes of problems. There will be two examples. A homogenization method is used for modeling the flow through hundreds of gaps and slits of spacecraft parachutes. This makes the problem tractable, with an accuracy that makes the comparison to test data very favorable. A temporal representation method with NURBS basis functions is used for the motion and deformation of the locust wings, for the motion and deformation of the volume meshes computed, and in remeshing. This provides an accurate way of matching the data extracted from the high-speed, multi-camera video recordings of a locust in a wind tunnel, and a robust and efficient way of dealing with the mesh in computations that include near topology changes. The computational results presented for these two classes of problems show that the ST FSI techniques are helping with the design in applications as complex as spacecraft parachutes and enabling us to model the aerodynamics of structures as intricate and hard to represent as the flapping wings of an actual locust. This is a joint work with Professor Kenji Takizawa, Department of Modern Mechanical Engineering and Waseda Institute for Advanced Study, Waseda University, Tokyo.

Biography: Dr. Tezduyar received his Ph.D. from Caltech in 1982. After postdoctoral work at Stanford, he had faculty positions at University of Houston and University of Minnesota. At Minnesota he became a full professor in 1991 and was named Distinguished McKnight University Professor in 1997. He was the Director and Principal Investigator of the Army High Performance Computing Research Center from January 1994 to October 1998 and was widely recognized for leading the center to the level of excellence it reached during that period. He joined Rice University in 1998 as James F. Barbour Professor in Mechanical Engineering and Materials Science. He served as chairman of the department from January 1999 to June 2004.

Dr. Tezduyar holds a 1986 Presidential Young Investigator Award from the National Science Foundation. He received the 1997 Computational Mechanics Award of the Japan Society of Mechanical Engineers, 1997 Computational Fluid Dynamics Award of the US Association for Computational Mechanics, 1998 Computational Mechanics Award of the International Association for Computational Mechanics, 2012 International Scientific Career Prize of the Argentine Association for Computational Mechanics, and 2013 Computational Mechanics Award of the Japan Association for Computational Mechanics. He was elected a Fellow of the American Society of Mechanical Engineers, US Association for Computational Mechanics, International Association for Computational Mechanics, American Academy of Mechanics, and the School of Engineering at University of Tokyo. He was named Highly Cited Researcher in engineering and computer science categories in the list updated by Thomson Reuters in 2014. He was awarded an honorary doctorate from Slovak Republic. In recognition of research excellence in parachute modeling, Dr. Tezduyar and his research team received the Commander's Educational Award for Excellence from the US Army Soldier Systems Command. Dr. Tezduyar and his research team won in 2012 the First Place Prize of Rice University Centennial Ken Kennedy Institute Research Nugget Competition. He was inducted, as an Eminent Engineer, to Tau Beta Pi, The Engineering Honor Society, Colorado Zeta at US Air Force Academy. Dr. Tezduyar was awarded a visiting professorship at University of Tokyo and a visiting professorship and chair of international cooperation at Tokyo Institute of Technology.

Dr. Tezduyar coauthored a textbook titled *Computational Fluid-Structure Interaction: Methods and Applications*, published by Wiley, co-translated a book, and edited 31 volumes. He published over 200 ISI-indexed journal articles, 20 other journal articles, over 40 book chapters, and over 170 invited conference papers. He is an Editor of *Computational Mechanics* (Springer) and *Surveys in Mathematical Sciences* (European Mathematical Society), and an Associate Editor of *Mathematical Models and Methods in Applied Sciences* (World Scientific) and *Journal of Mechanics* (Cambridge University Press). He is a Series Advisor to *Computational Mechanics* Series of Wiley and is on the Editorial Advisory Board of Springer series *Modeling and Simulation in Science, Engineering and Technology*. He serves on the editorial boards of many journals. Dr. Tezduyar served as the Chair of the ASME Applied Mechanics Division in 2010-2011, as a member of the Executive Committee of the ASME Applied Mechanics Division in 2006-2011, and as a member of the Executive Council of the International Association for Computational Mechanics in 2002-2014.

Semi-Plenary Speaker, Tuesday, July 28, 2015

1:00 – 1:45 pm, Harbor ABC

Computational Mechanics in Advancing the Integrated Computational Materials Science & Engineering (ICMSE) Initiative for Metals and Alloys

Somnath Ghosh, Johns Hopkins University

Abstract: The Integrated Computational Materials Science & Engineering or ICMSE initiative entails integration of information across length and time scales for relevant materials phenomena and enables concurrent analysis of manufacturing, design, and materials. Computational Mechanics plays an important role in this integration. This talk will present an integration of methods in Computational Mechanics and Computational Materials Science to address the deformation and failure characteristics of polycrystalline metals in various applications. Specifically this talk will address physics based modeling at different scales and multi-scale spatial (scale-bridging) and temporal modeling methods for Titanium, Magnesium and Aluminum alloys and Nickel base-superalloys. Spatial scales will range from atomistic to component levels, depending on the application. Application domains will include both monotonic and cyclic loading and address properties such as time and location-dependent strength, ductility and fatigue life.

The talk will begin with methods of 3D virtual image construction and development of statistically equivalent representative volume element or SERVEs for materials at multiple scales. Subsequently it will discuss the development of novel system of experimentally validated physics-based crystal plasticity finite element or CPFE models to predict deformation and micro-twinning leading to crack nucleation. These CPFE simulations will provide a platform for the implementation of physics-based crack evolution criterion that accounts for microstructural inhomogeneity. For crack evolution, a coupled molecular dynamics-continuum model for a crystalline material with an embedded crack will be discussed. A wavelet transformation based multi-time scaling (WATMUS) algorithm for accelerated crystal plasticity finite element simulations will be discussed as well. The WATMUS algorithm does not require any scale-separation and naturally transforms the coarse time scale response into a monotonic cycle scale without the requirement of sub-cycle resolution. The method significantly enhances computational efficiency in comparison with conventional single time scale integration methods. Finally, the talk will discuss stabilized element technology for analyzing this class of complex heterogeneous deformation problems.

Biography: Somnath Ghosh is the Michael G. Callas Chair Professor in the Department of Civil Engineering and Professor of Mechanical Engineering, and Materials Science & Engineering at Johns Hopkins University. At JHU, he is the founding Director of the Center for Integrated Structure-Materials Modeling and Simulation (CISMMS), and the Director/PI of the Air Force-JHU Center of Excellence in Integrated Materials Modeling (CEIMM). Prior to joining JHU, he was the John B. Nordholt Professor of Mechanical Engineering and Materials Science & Engineering at the Ohio State University till March 2011. He is currently the President of the United States Association of Computational Mechanics from 2014-2016 and a member of the IACM General Council. Professor Ghosh is a leader in the field of Computational Mechanics of Materials and Structures and has conducted important research in the field of spatio-temporal multi-scale and multi-physics modeling to advance the field of integrated computational structure-materials modeling into new areas of importance. He is recognized for his work in the Integrated Computational Materials Science & Engineering (ICMSE) paradigm, a subset of the Materials Genome Initiative. Professor Ghosh is a fellow of seven professional societies, including IACM and USACM.

Tuesday, July 28, 2015, Technical Session 4

ROOM	10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM	11:40 AM
TS4 MS1003 Material Design and Material Optimization, Chair(s): Sergey Kuznetsov, Oded Amir						
Harbor G	Non-Linear Mechanical Metamaterials	A New Approach for Stress-Based Topology Optimization Problems for Multi-Layer Composite Shell Structures	An Efficient Algorithm for 3D Multi-Material Topology Optimization Problems	The Complex Optimum of Trabecular Bone Structure		
	Corentin Coulais*	Cesar Kiyono*, Junuthula Reddy, Emilio Silva	Jaejong Park*, Alok Sutradhar	Darin Peetz*, Ahmed Elbanna		
TS4 MS803 Fluid-Structure Interaction, Chair(s): Ming-Chen Hsu						
Harbor H	Modal Analysis of Vibrations of Liquids Coupled with Structures	MaMiCo: Software Design for Coupled Massively Parallel Molecular-Continuum Flow Simulations	Assessment of a Method for Predicting Impact- and Impulse-Induced Fires	Numerical Analysis of the Interaction Between Wave and Sandy Seabed with a New Constitutive Model	Computational Free-Surface Fluid-Structure Interaction: Aquatic Sports, Offshore Floating Wind Turbines and Numerical Wave Generation	Advanced FSI Simulation of Wind Turbine RotorTower Interaction
	Roger Ohayon*, Jean-Sebastien Schotte	Philipp Neumann*, Nikola Tchipev, Hans-Joachim Bungartz	Flint Pierce*	Zhongtao Wang*, Peng Liu	Jinhui Yan*, Artem korobenko, Xiaowei Deng, Yuri Bazilevs	Michael C. H. Wu*, Carolyn N. Darling, Chenglong Wang, Dominik Schillinger, Ming-Chen Hsu
TS4 MS001 Minisymposium in Memory of Ted Belytschko: Advances in Meshfree, Particle, XFEM, GFEM, and Related Methods, Chair(s): J. S. Chen						
Harbor I	Cohesive Dynamics and Fracture	A Displacement Smoothing Induced Strain Gradient Stabilization for the Linear and Non-Linear Meshfree Galerkin Nodal Integration Method	Stable and Efficient Variationally Consistent Nodal Integration for Meshfree Methods Using Taylor Expansion	Consistent High-Order, Element-Free Galerkin Methods	Mean-Deformation-Gradient 8-Node Hexahedron with Optimized Energy-Sampling Stabilization	A Coupled Phase-Field, Shear Band Model for Dynamic Fracture
	Robert Lipton*	C.T. Wu*	Michael Hillman*, J. S. Chen	Qinglin Duan*, Xin Gao, Bingbing Wang, Xikui Li	Petr Krysl*	Haim Waisman*, Colin McAuliffe

ROOM	10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM	11:40 AM
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TS4 MS106 Biomechanics Modeling: Advances and Applications to Real World Problems, Chair(s): Petr Krysl

Bankers Hill	3D Image-Based Workflows for Model & Mesh Generation in Biomechanics Simulations: The Latest Trends and Applications	Computational Modeling of the Mechanics of Progression of Anterior Vaginal Prolapse (AVP)	Mathematical and Numerical Modelling for Microbial Weathering in Rocks			
	Kerim Genc*	Arnab Chanda*, Vinu Unnikrishnan, Samit Roy, Holly Richter	Hitoshi Matsubara*			

TS4 MS702 Peridynamics and Its Applications, Chair(s): Erdogan Madenci

Cortez Hill A	Convergence Studies of Meshfree Peridynamic Simulations	Mesh-Free Nonordinary Peridynamic Bending	Correcting the Surface Effect in Peridynamics: Applications to Elasticity, Fracture, and Material Interfaces	Numerical Dispersion in Peridynamics: Quality Assessment and Comparative Study Including Finite Difference and Finite Element Methods for Analyses of Wave Propagation in Solids	Micropolar Peridynamic Modeling of Quasibrittle Materials	
	Pablo Seleson*, David Littlewood	James O'Grady*	Quang Le*	Adam Martowicz*, Wieslaw J. Staszewski, Massimo Ruzzene, Tadeusz Uhl	Nicolas Sau*, Jose Medina, Ana Borbon	

TS4 MS705 Quasicontinuum and Other Atomistic-to-Continuum Coupling Techniques, Chair(s): Dennis Kochmann

Cortez Hill B	**Atomistic Modeling at Experimental Strain Rates and Time Scales	Temporal and Spatial Multi-Scale Simulation of Nanoindentation Using Hyper-QC				
	Harold Park*	Woo Kyun Kim*, Ellad Tadmor				

ROOM	10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM	11:40 AM
TS4 MS402 Numerical Methods for Hydraulic Fracture Simulation, Chair(s): Dakshina Valiveti/Peter Gordon						
Cortez Hill C	Development, Validation and Application of Simulation Capabilities for Hydraulic-Driven Fracture Propagating in Porous Medium	Modeling Simultaneous Initiation and Propagation of Hydraulic Fractures Transverse to a Horizontal Wellbore	Modeling Dynamic Stimulation of Geologic Resources	Modeling Genesis of Natural Fractures Using XFEM	A Fully Coupled Finite Element/Finite Volume Approach to Hydraulic Fracture Simulation for Massively Parallel Simulations	Three-Dimensional Modeling Investigation of the Parameters Controlling Re-Orientation of Hydraulic Fractures when Encountering Pre-Existing Natural Fractures
	Jing Ning*, Matias Zielonka, Gilbert Kao, Garzon Jorge, Nikolay Kostov, Kevin Searles, Scott Buechler, Pablo Sanz Rehermann	Brice Lecampion*, Jean Desroches	Oleg Vorobiev*, Joe Morris, Eric Herbold, Bradley White	Gauthier Becker*, Hao Huang, Varun Gupta, Rodrick Myers	Randolph Settgast*, Joshua A. White, Pengcheng Fu, Stuart D.C. Walsh, Mike Puso, Joseph P. Morris	Navid Zolfaghari Moheb*, Andrew P. Bunger
TS4 MS604 Challenges in Scientific Computing at Extreme Scale, Chair(s): Onkar Sahni						
Cove	Unstructured Mesh Partitioning for Adaptive Workflows	Progress on Manycore Multiphysics Simulation in Albany Using the Kokkos Portable Hardware Abstraction Library	Towards Massively Parallel Higher-Order Immersed Domain and Isogeometric Finite Element Analysis	Parallel Scalable Anisotropic Adaptation for Fluid-Structure Interaction	Scaling Study of Large Eddy Simulations with Dynamic Models	Goal-Oriented Sensitivity Analysis and Error Estimation for an Adaptive Mesh Refinement Moving Boundary Flow: Application on Geophysical Flow
	Cameron Smith*, Michel Rasquin, Dan Ibanez, Mark Shephard	Glen Hansen*, Andrew Bradley, Irina Demeshko, Brian Granzow, Alejandro Mota, Andy Salinger, Irina Tezaur	Vasco Varduhn*, Dominik Schillinger	Youssef Mesri*, Elie Hachem	Onkar Sahni*, Steven Tran	Hossein Aghakhani*, Abani K. Patra

ROOM	10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM	11:40 AM
TS4 MS1013 Modeling and Simulation of 3D Printing and Additive Manufacturing, Chair(s): Albert To						
Golden Hill A	Constitutive Modeling for Additive Manufactured Photopolymers Considering the Effect of Print Orientation	Analysis of the Mechanical Response of Biomimetic Materials with Highly Oriented Microstructures Through 3D Printing, Mechanical Testing and Modeling	Mechanics-Based Characterization of Separation Force in Constrained-Surface-Based Photo-Polymerization Process	Simulation and Design of Fiber Orientation in Products Produced with the FDM Additive Manufacturing Process	Homogenization of Additive Manufactured Polymeric Foams with Spherical Cells	
	Pu Zhang*, Albert To	Pablo Zavattieri*, Enrique Escobar, Chanhue Jeong, Lessa Grunenfelder, David Kisailus	Abhishek Venketeswaran*, Sonjoy Das, Hang Ye, Chi Zhou	Douglas Smith*, Blake Heller, David Jack,	Hamed Zeinalabedini*, Pu Zhang, Mesut Kirca, Albert C. To	
TS4 MS112 Computational Modeling and Simulation of the Cardiovascular System, Chair(s): Boyce Griffith						
Golden Hill B	**Structure, Properties and Function of the Human Femoropopliteal Artery		Towards Computational Diagnosis of Coronary Artery Disease	Accounting for Energy Losses Associated with Wall Viscoelasticity by Estimating Boundary Conditions in One-Dimensional Arterial Networks	A Two-Dimensional Surface Model for Near-Wall Transport in the Large Arteries	Modeling of Fiber Damage in Arterial Walls Based on a Relaxed Incremental Variational Formulation
	Alexey Kamenskiy*, Jason MacTaggart		Simon Shaw*	Christina Battista*, Mansoor Haider, Mette Olufsen	Kirk B. Hansen*, Shawn C. Shadden	Daniel Balzani*, Thomas Schmidt
TS4 MS809 Particle-Based Methods in Fluid Mechanics						
Hillcrest A	Why Particle Methods Can Go Faster than Classical FEM to Solve Convective-Dominant Problems?	Virtual Laboratory Based on a Coupling of DEM and MAC Methods	Discrete-Element Bonded-Particle Model of Sea Ice Deformation and Fragmentation	Large-Scale Suspension Flow Simulations Using a Particle Method on a GPU Supercomputer	Regularity and Connectivity Conditions of a Generalized Particle-Based Method for Partial Differential Equations	
	Sergio Idelsohn*, Eugenio Oate, Norberto Nigro, Julio Martí, Pablo Becker, Juan Giménez	Varvara Roubtsova*, Mohamed Chekired	Agnieszka Herman*	Takayuki Aoki*, Satori Tsuzuki, Seiya Eatnabe	Daisuke Tagami*, Yusuke Imoto	

ROOM	10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM	11:40 AM
TS4 MS410 Mathematical and Numerical Modeling of Degradation of Materials and Structures, Chair(s): Kaspar Willam						
Hillcrest B	Peridynamic Modeling of Pitting Corrosion Damage	A 3D Meso-scale Model to Describe the Mechanical Effects of the Alkali-silica Reaction in Concrete	Micromechanica I Modeling of the Elastoplastic Behavior of a Carbonated Petroleum Cement Paste	Error Analysis of DIC Imaging Data Using Least Square Approximation	Deviatoric Shape of Concrete Failure Surface Based on Bezier Curves	
	Ziguang Chen*, Guanfeng Zhang, Florin Bobaru	Aurelia Cuba Ramos*, Cyrille Dunant, Jean-Franois Molinari	Hamid Ghorbanbeigi*	Kaspar Willam*, Shahriyar Beizaee, Giovanna Xotta	Paula Folino*	
TS4 MS301 Multiscale Computational Homogenization for Bridging Scales in the Mechanics and Physics of Complex Materials, Chair(s): K. Matous, V. Filonova						
Hillcrest C	**Multi-Scale Computational Homogenization of Microscale Localization Towards Macroscale X-FEM Description		Phase-Field Fracture Modeling of Microstructures with Random Void Distribution	Multi-Scale Modeling of Shale Gas, Study of Macroscopic Behavior and of Cracking Phenomenon	Characterization of Macroscopic Strength Degradation in Polycrystalline Metals Due to Fatigue Aging	
	Varvara Kouznetsova*, Emanuela Bosco, Marc Geers		Tong-Seok Han*, Xiaoxuan Zhang , Sang-Yeop Chung , Christian Linder	Alexis Vallade*, Jean-Baptiste Colliat, Jian Fu Shao	Yuichi Shintaku*, Mayu Muramatus, Shinsuke Takase, Shuji Moriguchi, Seiichiro Tsutsumi, Kenjiro Terada	
TS4 MS203 International Symposium of High-order Methods for Computational Fluid Dynamics, Chair(s): Peter Vincent						
Hillcrest D	**High-Order Discontinuous Galerkin Simulations on Domains with Large Deformations		Unsteady CFD Shape Optimization Using High-Order Discontinuous Galerkin Finite Element Methods	Towards Efficient Simulation of Unsteady Incompressible Flows Using Dual-Time Stepping CPR-DG Methods on Unstructured Moving Grids	An Adaptive Finite Volume Method for Steady Euler Equations with k-Exact WENO Reconstruction	
	Per-Olof Persson*, Luming Wang		Matthew Zahr*, Per-Olof Persson	Meilin Yu*, Lai Wang	Guanghui Hu*, Nianyu Yi	

ROOM	10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM	11:40 AM
TS4 MS502 Immersed/Embedded/fictitious Domain Methods and Their Application in Analysis and Optimization, Chair(s): Isaac Harari						
Mission Beach A	The Finite Element Immersed Boundary Method with Distributed Lagrange Multiplier	Higher-Order Immersed Discontinuous Galerkin Methods for Interface Problems	An Agglomerated Multi-Grid Algorithm for Steady Compressible Flows with Embedded Boundaries	Treating a Vesicle Membrane as an Immersed Boundary to Simulate Cell Desiccation		
	Daniele Boffi*	Slimane Adjerid*	Alex Main*	Chris Vogl*		
TS4 MS403 Numerical Modeling and Computational Methods of Impact and Blast Problems, Chair(s): Chao Zhang						
Mission Beach B	**Dynamic Crashing Behaviour of New Extrudable Multi-Cell Tubes with Functionally Graded Thickness		Modelling the Macro-Mechanical Axial Progressive Damage of Carbon/Glass Epoxy Circular Tubes	Multi-Objective Optimization for Concrete Barrier Based on RBF Model	A Reliability Analysis Method for Crash and Impact Problems Using Augmented RBF Metamodels	A Representative -Sandwich Model for Mechanical-Crush and Short-Circuit Simulation of Lithium-Ion Battery
	Qing Li*, Jianguang Fang, Yunkai Gao, Guangyong Sun		Alia Ruzanna Aziz*, Zhongwei Guan, Wesley James Cantwell, Tawan Boonkong	Hanfeng Yin*, Howie Fang, Guilin Wen, Youxie Xiao	Qian Wang*, Hongbing Fang, Daniil Kuvila	Chao Zhang*, Shiram Santhanagopalan, Michael Sprague, Ahmad Pesaran
TS4 MS506 Advances in Computational Methods for Inverse Problems, Chair(s): Wilkins Aquins and Assad Oberai						
Mission Beach C	**Markov Chain Monte Carlo Samples for Bayesian Inverse of Structural Dynamic Systems		A Sweeping Window Method for Flaw Detection Using an Explicit Dynamic XFEM with Absorbing Boundary Layers	Large-Scale Inversion of the Lam Parameters in PML-Truncated Domains Using Full-Waveforms	A Gauss-Newton Optimization Method for Material Profile Inversion in 2D Heterogeneous Semi-Infinite Media Using Scalar Waves	Amplitude-Preserving Propagators to Improve the Efficiency of Full Waveform Inversion
	Christophe Lecomte*		Hao Sun*, Haim Waisman, Raimondo Betti	Arash Fathi*, Loukas Kallivokas	Alireza Pakravan*, Jun Won Kang, Craig M. Newtson	Mehran Eslaminia*, Murthy Guddati

ROOM	10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM	11:40 AM
TS4 MS906 Calibration, Validation, and Bayesian Approaches in Predictive Modeling and Simulation, Chair(s): Tim Wildey						
Ocean Beach	**Quantifying the Impact of Numerical Errors Along with Other Uncertainties on Hazard Forecasting		Numerical Error in Model Evaluation and its Effect on Surrogate Construction	Scalable Algorithms for Kernel Sums in Computational Physics and Statistical Inference	An Approach to Big-Data in Large-Scale PDE-Constrained Bayesian Inverse Problems in High-Dimensional Parameter Spaces	
	Elaine Spiller*, Hossein Aghakhani, Abani Patra, Bruce Pitman		Abani Patra*, Hossein Aghakhani, Elaine Spiller	George Biros*	Ellen Le, Aaron Myers, Tan Bui-Thanh*	
ROOM	10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM	11:40 AM
TS4 MS205 Free and Moving Boundary: Methods and Applications, Chair(s): Rekha Rao						
Pier	**An Improved Compressible, Multi-Phase, Semi-Implicit Method with Moment of Fluid Interface Representation		Interface Tracking For Modeling Thermal Decomposition of Polymer Foams	New Stabilized Level-Set Formulation for the Simulation of Newton and Non-Newtonian Fluids and Multi-Materials	Finite Element Methods for Free- and Moving-Boundary Problems Using Universal Meshes	The Space-Time Version of The NURBS-Enhanced Finite Element Method (NEFEM) For Free-Surface Flow Computations
	Mark Sussman*, Matthew Jemison, Marco Arienti, M. Yousuff Hussaini		Victor Brunini*, Ryan Keedy, Sarah Scott, David Noble, Amanda Dodd	Stephanie Riber*, Rudy Valette, Elie Hachem	Evan Gawlik*, Adrian Lew	Atanas Stavrev*, Philipp Knechtges, Elgeti Stefanie, Marek Behr
TS4 MS302 Multi-Scale and Multi-Physics Computations in Fluids and Solids, Chair(s): Yozo Mikata						
Promenade A	Effective Thermal and Elastic Properties of a Composite with Spheroidal Inhomogeneities	Strain Localization in the Presence of Microstructural Evolution	A Multi-Scale Micromorphic Molecular Dynamics (MMMD)	Wavelet Transformation Induced Multi-Time Scaling (WATMUS) Model for Coupled Transient Electro-Magnetic and Structural Dynamics Finite Element Analysis		
	Yozo Mikata*	John Bassani*	Shaofan Li*	Reza Yaghmaie*, Somnath Ghosh		

ROOM	10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM	11:40 AM
TS4 MS706 Advancement in Hydrocodes, Chair(s): Mikhail Shashkov						
Promenade B	Scalable High-Order ALE Simulations	Closure Models for High-Order Finite Element Hydrodynamics	A Cell-Centered Finite Volume Method for Solving Multi-Dimensional Hyperelasticity Equations Written Under Total Lagrangian Form	Strong Coupled Analysis by Multi-Material Eulerian Hydrocode	Numerical Framework for Mesoscale Simulation on Heterogeneous Energetic Materials	
	Tzanio Kolev*, Robert Anderson, Thomas Brunner, Veselin Dobrev, Ian Karlin, Robert Rieben, Vladimir Tomov	Vladimir Tomov*	Gabriel Georges*, Jrme Breil, Pierre-Henri Maire	Shigenobu Okazawa*, Hirofumi Ueda, Toru Hamasaki	Nirmal Kumar Rai*, H.S. Udaykumar	
TS4 MS406 Computational Fracture Mechanics, Chair(s): Christian Linder						
Solana Beach A	**Phase-Field Modeling of Propagation and Coarsening of Segmented Crack Fronts in Mode I+III Fracture		Phase Field Formulation for Brittle Fracture in an Euler-Bernoulli Beam	Mesoscale Analysis of Crack-Induced Diffusivity of Concrete Through a Phase-Field Modeling Approach		
	Alain Karma*, Matteo Nicoli, Veronique Lazarus		Yongxing Shen*, Jian Gao	Tao Wu*, Laura De Lorenzis		
TS4 MS208 Large Eddy and Direct Numerical Simulations with Geophysical Applications, Chair(s): Andres Tejada-Martinez						
Solana Beach B	Towards Understanding the Wave-Supported Gravity-Driven Mud Flows: Application of Direct Numerical Simulations	Large-Eddy Simulation of Oil Dispersion in the Ocean Mixed Layer				
	Celalettin Ozdemir*	Marcelo Chamecki*, Di Yang, Bicheng Chen, Charles Meneveau				

ROOM	10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM	11:40 AM
TS4 MS113 Phase Field Methods for Moving Interfaces in Physics and Biology , Chair(s): Shiva Rudraraju						
Torrey Hills A	Modeling of Polymer Blends with Diffuse Interfaces and Free Surface Through the Cahn-Hilliard Equation	Phase-Field Models of Tumor Growth: The Effects of Bio-mechanical Stress Fields, Degradation, and Remodeling of the Macro-environment	Unconditionally Stable Second-Order Time Integration Algorithms for Coupled Mechano-Chemistry	Modeling the Evolution of Microdomains on Three-Dimensional Giant Unilamellar Vesicles with a Phase-Field Approach	Phase-Field Modeling of Biological Membranes	
	Santiago Madruga*, Fathi Bribesh, Uwe Thiele	Ernesto A B F Lima*, Regina C Almeida, J. Tinsley Oden, Danial Faghihi	Koki Sagiama*, Krishnakumar Garikipati, Shiva Rudraraju	Wen Jiang*, Anand Embar, John Dolbow, Eliot Fried	Guillermo Lzaro*, Ignacio Pagonabarraga, Aurora Hernndez-Machado	
TS4 MS908 Applications of Error Estimation and Model Adaptation in Computational Mechanics, Chair(s): L. Chamoin and M. Laforest						
Torrey Hills B	Instance Optimality of the Adaptive Maximum Strategy	Adaptive Discontinuous Galerkin Methods on Polytopic Meshes	Goal-Oriented Model Adaptivity for Viscous Flows	Adaptive Wavelet Enhancement of the Classical Crystal Plasticity Finite Element Method Consistent with Error Patterns	Representing the Earths Surface with a Spherical Tessellation in Satellite Based Remote Sensing Simulations	
	Christian Kreuzer*	Paul Houston*	Timo van Opstal*, Paul Bauman, Serge Prudhomme, Harald van Brummelen	Yan Azdoud*, Jiahao Cheng, Somnath Ghosh	Keith Dalbey*, Daniel Arpin, Matthew Martin, Ronald Shaw, ,	

Tuesday, July 28, Technical Session 5

ROOM	02:00 PM	02:20 PM	02:40 PM	03:00 PM	03:20 PM	03:40 PM
TS5 MS1003 Material Design and Material Optimization, Chair(s): Kenjiro Terada, Sergey Kuznetsov						
Harbor G	**Neural Networks for Computational Homogenization and Optimization of Hyperelastic Heterogenous Materials	Dynamic Design Using Topology Optimization of Laminated Piezocomposites Structures (LAPS) with Coupled Electric Circuits for Energy Harvesting Purposes	Topology Optimization Method Applied to the Design of a Rotating Piezo-Structure Subjected to Active Control Law	Multi-Scale Simulations for Ductile Failures with Microscopic Void Growing		
	Julien Yvonnet*, Ba Anh Le, Qi-Chang He	Ruben Andres Salas*, Emilio Carlos Nelli Silva, Junuthula N. Reddy	Mariana Moretti*, Wilfredo Rubio, Emilio Silva	Hirofumi Sugiyama*, Kazumi Matsui, Takuya Endo, Shingo Inami, Takahiro Yamada		
TS5 MS105 Biomedical Fluid Mechanics and FSI, Chair(s): Ming-Chen Hsu						
Harbor H	**Hi2Mod: High-Order Isogeometric Hierarchical Model Reduction of Elliptic Problems in Curved Domains	Viscosity Reduction in Bimodal Suspensions of Two Types of Capsules	Carotid Artery Stenting Haemodynamics: A Patient-Specific CFD Analysis	Arterial Wall Modeling with Time-Dependent Surface Extraction from Medical Images	Coupled Modeling of Non-Newtonian Blood Flows Through Distensible Viscoelastic Arteries	
	Alessandro Reali*, Simona Perotto, Paolo Rusconi, Alessandro Veneziani	Yohsuke Imai*, Hiroki Ito, Daiki Matsunaga, Toshihiro Omori, Takami Yamaguchi, Takuji Ishikawa	Michele Conti*, Christopher Long, Alessandro Reali, Yuri Bazilevs, Ferdinando Auricchio	Takafumi Sasaki*, Kenji Takizawa, Tayfun Tezduyar, Hirokazu Takagi, Keiichi Itatani, Shohei Miyazaki, Kagami Miyaji	JaeHyuk Kwack*, Arif Masud,	
TS5 MS001 Minisymposium in Memory of Ted Belytschko: Advances in Meshfree, Particle, XFEM, GFEM, and Related Methods, Chair(s): R. Lipton						
Harbor I	**A Stabilized Quasi-Linear Reproducing Kernel Particle Method for Modeling Material Damages Under Extreme Events	Quasi-Convex Reproducing Kernel Meshfree Approximants	Element-Free Analysis of Some Mathematical Problems	Strong and Weak Coupling of Finite Element and Reproducing Kernel Approximation s	An Assumed Strain Based Moving Particle Finite Element and Extensions	
	J. S. Chen*, Edouard Yreux, Mike Hillman	Dongdong Wang*, Pengjie Chen, Hanjie Zhang, Junchao Wu	L.W. Zhang*, K.M. Liew	Hsin-Yun Hu*, Jiun-Shyan (JS) Chen	Su Hao*	

ROOM	02:00 PM	02:20 PM	02:40 PM	03:00 PM	03:20 PM	03:40 PM
TS5 MS106 Biomechanics Modeling: Advances and Applications to Real: World Problems, Chair(s): Petr Krysl						
Bankers Hill	Towards Building Correspondence Rules Between Human and Pig Head Models for Traumatic Brain Injury	Image-to-Mesh Conversion for Arteriovenous Malformation Surgical Simulators	Biomechanical Modeling of Breast Shape and Deformation After Mastectomy Reconstruction Surgery	The Benefit of Geometrical Personalization on Pedestrian FE Model Response in Vehicle-Pedestrian Impact		
	Siddiq Qidwai*, Nithyanand Kota, Amit Bagchi	Fotis Drakopoulos*, Ricardo Ortiz, Andient Enquobahrie, Nikos Chrisochoides	Alok Sutradhar*	David Poulard*, Huipeng Chen, Matthew Panzer		
TS5 MS702 Peridynamics and Its Applications, Chair(s): Florin Bobaru						
Cortez Hill A	Peridynamics for Modeling Crack Formation and Growth in Nuclear Fuel Pellets	Dielectric Breakdown Modeling Using Peridynamics	Peridynamic Modeling of Carbon Nanotube Reinforced Polymer Nanocomposites	Modeling of Contact and Non-Local Friction in a Peridynamic Framework		
	Erdogan Madenci*, Selda Oterkus	Raymond Wildman*, George Gazonas	Naveen Prakash*, Gary Seidel	Jason York*, John Foster		
TS5 MS402 Numerical Methods for Hydraulic Fracture Simulation, Chair(s): Dakshina Valiveti/Peter Gordon						
Cortez Hill C	Three-Dimensional Simulator for Pressurized Cracks	3D Numerical Model of Early Stage of Hydraulic Fracturing	Dynamic Assessment of Stress Field Behavior Induced by Fracture Tip Propagation in Quasi-Brittle/Ductile Shale Reservoirs: A New Approach Based on Modified Theory of Critical Distances	Computational Modelling of Fluid-Driven Fracture in 3D	Performance of Horizontal Fracture in Low-Permeability Shallow Reservoirs	
	Sofia Mogilevskaya*, Dmitry Nikolskiy	Denis Esipov*, Dmitry Kuranyakov, Vasily Lapin, Sergey Cherny	Ebrahim Fathi*, Andrew Jenkins, Lilia Reddy	Guoquiang Xue*, Lukasz Kaczmarczyk, Chris Pearce	Da Peng Gao*, Ji Gen Ye, Lei Huang	

ROOM	02:00 PM	02:20 PM	02:40 PM	03:00 PM	03:20 PM	03:40 PM
TS5 MS604 Challenges in Scientific Computing at Extreme Scale, Chair(s): Onkar Sahni						
Cove	Challenges for Exascale Scalability of Elliptic Solvers Using a Model Poisson Solver and Comparing State-of-the-Art Methods	Performance of Finite Element Models of Turbulent Air/Water Flow in Coastal and Hydraulic Applications	Towards Extreme Computing for Uncertainty Quantification in Seismic Imaging	Aerodynamic Design for Unsteady Flows Using An Adjoint Approach	Multi-Scale Multiphysics Simulations at Extreme Scale Using Uintah	
	Amir Gholaminejad*, Georg Biros	Matthew Farthing*, Christopher Kees, Aron Ahmadia, Jed Brown, Barry Smith, Aggelos Dimakopolous, Eleni Zve, Giovanni Cuomo	Alvaro Coutinho*, Leonardo Borges, Danilo Costa, Thibaut Lavril, Luciano Leite, Thomas Miras, Marta Mattoso, Fernando Rochinha, Josias Silva, Vitor Souza	Eric Nielsen*, Boris Diskin	Martin Berzins*	
TS5 MS1008 Modeling Materials with Coupled Physics (Thermo- Electro- Chemo- and Magneto-Mechanics), Chair(s): Jean-Paul Pelteret						
Golden Hill A	**Evolutionary Algorithms Applied to Experimental Analysis and Computational Simulation of Magnetorheological Elastomers		A Finite Element Model of Self-Sensing Piezoelectric Sensor for Damage Detection Undergoing Dynamic Finite Deformation	Computational Modeling of Piezoresistive Response in CNT-Polymer Nanocomposites Using Material Point Method		
	Jean-Paul Pelteret*, Bastian Walter, Jochen Kaschta, Paul Steinmann		Shu Guo*, Somnath Ghosh	Adarsh Chaurasia*, Gary Seidel		
TS5 MS112 Computational Modeling and Simulation of the Cardiovascular System, Chair(s): Daniel Balzani						
Golden Hill B	**The Living Heart Project: Modeling Pathologies of Systolic and Diastolic Heart Failure		Method and Energy Laws for the Unique Identification of Material Properties: Application to the Passive Myocardium	A Variational Framework for Electromechanical Viscoelastic Constitutive Modeling of the Heart	Association of Intraluminal Thrombus and Hemodynamic Factors for Abdominal Aortic Aneurysm Expansion	Optimization of the Parametric Design of a Bioprosthetic Heart Valve Based on Isogeometric Analysis
	Ellen Kuhl*, Martin Genet, LikChuan Lee, Brian Baillargeon, Julius M Guccione		Luigi E. Perotti*, Aditya Ponnaluri, Shankarjee Krishnamoorthi, Daniel Balzani, William S. Klug, Daniel B. Ennis	Aditya Ponnaluri*, Luigi Perotti, William Klug	Byron Zambrano*, Hamidreza Gharahi, Jongeun Choi, Chae-Young Lim, Farhad Jaber, Whal Lee, Seungik Baek	Joshua Mineroff*, Chenglong Wang, Baskar Ganapathysubramanian, Ming-Chen Hsu

ROOM	02:00 PM	02:20 PM	02:40 PM	03:00 PM	03:20 PM	03:40 PM
TS5 MS303 Recent Progress in Multi-scale Modeling at the Intersection of Ab-initio Methods, Mechanics and Mathematics, Chair(s): Vikas Tomar						
Harbor ABC	Electronic Structure Study of an Edge Dislocation in Aluminum	Fast Algorithms for Electronic Structure Analysis	An All-Electron DFT Calculation Using Spectral Gauss Quadrature	Understanding Prismatic Dislocation Loops in Mg by Means of Large-Scale Ab-Initio Simulations	A Systematic Framework for the Prediction of Twinning in Magnesium Validated Through Large-Scale Ab-Initio Simulations	
	Vikram Gavini*, Mrinal Iyer, Balachandran Radhakrishnan	Lin Lin*	Xin Wang*	Mauricio Ponga*, Kaushik Bhattacharya, Michael Ortiz	Dingyi Sun*, Mauricio Ponga	
TS5 MS701 Isogeometric Methods, Chair(s): R. De Borst						
Harbor DEF	Isogeometric Local H-Refinement Strategy Based on Multigrids	Interactive Design Through Parametric Modeling and Isogeometric Analysis of Wind Turbine Blades	Adaptively Refined Multi-Patch B-Splines with Enhanced Smoothness	Isogeometric Analysis Suitable Trivariate NURBS Models from Standard B-Rep CAD	Enriched Surface Finite Elements: A Simple Technique to Combine Isogeometric and Standard Finite Element Discretizations	Hybrid Collocation-Galerkin Approach for the Analysis of Surface Represented Solids
	Alexandre Chemin*, Thomas Elguedj, Anthony Gravouil	Austin Herrema*, Chenglong Wang, Ming-Chen Hsu	Florian Buchegger*, Bert Jttler, Angelos Mantzaflaris	Hassan Al Akhras*, Thomas Elguedj, Anthony Gravouil, Michel Rochette	Roger Sauer*, Callum Corbett, Raheel Rasool	Lin Chen*, Wolfgang Dornisch , Sven Klinkel
TS5 MS809 Particle-Based Methods in Fluid Mechanics, Chair(s): Sergio Idelsohn						
Hillcrest A	A Three-Dimensional Remeshed Hybrid Smooth Particle-Mesh Method for the Simulation of Compressible Turbulent Flow	Adaptive Resolution Simulation of Polarizable Supramolecular Water Models	Numerical Noises in Various Material Point Methods	Underwater Collapse of Tall Granular Columns	An Eulerian Method for Computation Shock Wave Problem with Meshfree RKPM Shock-Capturing and Non-Oscillation Schemes	
	Anas Obeidat*	Matej Praprotnik*, Julija Zavadlav, Manuel Nuno Melo, Siewert J. Marrink	Duan Zhang*	Krishna Kumar*, Kenichi Soga, Jean-Yves Delenne	Jia-Hong Jiang *, Chien-Ting Sun, Pai-Chen Guan	

ROOM	02:00 PM	02:20 PM	02:40 PM	03:00 PM	03:20 PM	03:40 PM
TS5 MS410 Mathematical and Numerical Modeling of Degradation of Materials and Structures, Chair(s): Daniel Turner						
Hillcrest B	Towards Digital Image Correlation Methods Robust Enough to Characterize Degradation of Materials	An Optimization-Based Approach to Stiffness and Strength Degradation Models	On Designing Staggered Coupling Algorithms for Modeling Degradation of Materials			
	Daniel Turner*	Zahra S. Lotfian*	Maruti Kumar Mudunuru*, Kalyana Nakshatrala, Can Xu			
TS5 MS310 Multiscale Simulation for Failure and Uncertainty Quantification in Engineering Applications, Chair(s): Somnath Ghosh						
Hillcrest C	**Comparison in 3D of Microstructural Evolution in Deformation with Simulation		Modeling Fatigue from Micro-Scale Crack Initiation to Component Failure with Propagated Uncertainty Across Scales	New Insights in Fatigue Crack Initiation and Small Crack Growth Regime: Coupled Micro-Mechanical Testing and Crystal Plasticity Modeling	Multiscale Simulation of Observed 3D Crack Evolution in a Polycrystalline Aluminum Alloy	
	Anthony Rollett*, Reju Pokharel, Robert Suter, Ricardo Lebensohn		Jacob Hochhalter*, W. Paul Leser, James Warner, Patrick Leser, Geoff Bomarito, J. Andy Newman	Panos Efthymiadis*, Christophe Pinna, Richard Dashwood, Barbara Shollock, John Yates	Ashley Spear*, Jacob Hochhalter, Albert Cerrone, Alexander Douglass	
TS5 MS203 International Symposium of High-order Methods for Computational Fluid Dynamics, Chair(s): Georg May						
Hillcrest D	Non-Linear Stabilization of High Order Schemes in Unstructured Grids via Local Fourier Spectral Filtering	Comparison of Output Error Estimation for Finite Element Discretizations of Convection-Dominated Flows	A High-Order Discontinuous Galerkin Solver for Unsteady Incompressible Turbulent Flows	High-Order Finite Element Analysis of Boundary Layer Flows	PyFR: High-Order Accurate Computational Fluid Dynamics on Unstructured Grids	
	Manuel Lpez-Morales*, Antony Jameson	Hugh Carson*, Steven Allmaras, Marshall Galbraith, David Darmofal	Gianmaria Noventa*, Francesco Carlo Massa, Alessandro Colombo, Francesco Bassi, Antonio Ghidoni	Alvin Zhang*, Onkar Sahni	Peter Vincent*	

ROOM	02:00 PM	02:20 PM	02:40 PM	03:00 PM	03:20 PM	03:40 PM
TS5 MS502 Immersed/Embedded/fictitious Domain Methods and Their Application in Analysis and Optimization, Chair(s): Martin Ruess						
Mission Beach A	A Computational Framework for the Simulation of High-Speed Multi-Material Fluid-Structure Interaction Problems with Dynamic Fracture	Extending Spatial Simulation Domains of Existing Applications with Minimal Invasiveness	Unsteady Residual Distribution Schemes Adapted to Immersed Boundary Methods on Unstructured Grids to Account for Moving Bodies			
	Kevin Wang*, Patrick Lea, Charbel Farhat	Michael Lahner*, Miriam Mehl	Hlose Beaugendre*, Lo Nouveau, Ccile Dobrzynski, Rmi Abgrall, Mario Ricchiuto			
TS5 MS506 Advances in Computational Methods for Inverse Problems, Chair(s): Wilkins Aquino and Paul Barbone						
Mission Beach C	Efficient Algorithms for Forward and Inverse Modeling of Multilayered Waveguides and Half-Spaces	Mode-Based Inverse Identification of Turbine-Blade Geometry Using Surrogate-Based Optimization	Topology Design of Antenna Applied to the Treatment of Cancer by Hyperthermia	Assessment of the Feasibility for Using Statistical Shape Analysis for Material Characterization of the Human Right Ventricle	Characterization of True Stress-Strain Behavior of Plastic Materials via Inverse Finite Element Analysis	
	Ali Vaziri Astaneh*, Murthy Guddati	Satchi Venkataraman*, Vaibhav Yadav, Scott Bland	Alan Amad*, Thiago Quinelato, Abimael Loula, Antonio Novotny	Jing Xu*, John Brigham	Jie Feng*, Yijian Lin, Jeff Zawisza, Todd Hogan, Rashi Tiwari, Sam Crabtree, Brandon Weinlander	
TS5 MS905 Stochastic Methods in Computational Mechanics of Random Materials, Chair(s): Johann Guilleminot						
Ocean Beach	**Multi-Variate Weighted Leja Sequences for Polynomial Approximation and UQ		Cost Reduction via Domain Simplification in the Karhunen-Love Expansion	Solution of Large-Scale Problems in Structural Analysis: Monte Carlo Simulation vs. Spectral Stochastic Finite Element Method	Approximation of Effective Coefficients in Stochastic Homogenization Using a Boundary Integral Approach	On Error Estimation of the Stochastic Perturbation Method for Random Media
	John Jakeman*, Akil Narayan		Srikara Pranesh*, Debraj Ghosh	Manolis Papadrakakis*, George Stavroulakis, Dimitris G. Giovanis, Vassilios Papadopoulos	Virginie Ehrlacher*	Chenfeng Li*, Xiangyu Wang, Song Cen

ROOM	02:00 PM	02:20 PM	02:40 PM	03:00 PM	03:20 PM	03:40 PM
TS5 MS205 Free and Moving Boundary: Methods and Applications, Chair(s): Jonathan Clausen						
Pier	**From Fluid Mechanics to Magnetohydrodynamics: Challenges in the Finite Element Modeling of MHD Free Surface Flows	Drop Circulation in Hele Shaw Flow	A DLM/FD/IB Method for Simulating Compound Vesicle Motion Under Creeping Flow Condition	Using a Sliding Mesh Scheme with Arbitrary Mesh Motion to Simulate the Motion of a Liquid Within a Piston Assembly Subjected to Vibrational Acceleration	Time-Dependent Viscoelastic Multiphase and Free Surface Flows with a Stabilized Finite Element Method	
	Steven Dufour*, Roland Rivard	Scott Roberts*, Christine Roberts, Rekha Rao	Tsorng-Whay Pan*, Roland Glowinski	Jonathan Clausen*, John Torczynski, Louis Romero, Timothy O'Hern	Daniel Hariprasad*, Kristianto Tjiptowidjojo, Rekha Rao, P. Randall Schunk, Peixi Zhu, Matthew Balhoff	
TS5 MS302 Multi-Scale and Multi-Physics Computations in Fluids and Solids, Chair(s): Gary Dargush						
Promenade A	The Alternating Schwarz Method for Concurrent Multi-Scale in Finite Deformation Solid Mechanics	Multiscale Modeling of the Interaction of a Shock Wave with a Particle-Laden Gas Using Metamodeling Techniques	Bridging Different Length and Time Scales in Dusty Disk-Planet Interaction Simulations	Mixed Convolved Action for Computational Dynamic Thermoelasticity		
	Alejandro Mota*, Irina Tezaur	Oishik Sen*, Sean Davis, Gustaaf Jacobs, H.S. Udaykumar	Shengtai Li*	Gary Dargush*, Bradley Darrall		
TS5 MS706 Advancement in Hydrocodes, Chair(s): Shigenobu Okazawa						
Promenade B	**Adaptive Reconnection-Based Arbitrary Lagrangian Eulerian Methods	Multi-Material Remap Algorithms for High-Order Finite Element Arbitrary Lagrangian-Eulerian (ALE) Simulations	A 3D Anisotropic Diffusion Scheme for Laser Plasma Interaction on ALE-AMR Meshes			
	Mikhail Shashkov*	Veselin Dobrev*, Robert Anderson, Thomas Brunner, Tzanio Kolev, Robert Rieben, Vladimir Tomov	Pascal Jacq*, Jerome Breil			

ROOM	02:00 PM	02:20 PM	02:40 PM	03:00 PM	03:20 PM	03:40 PM
TS5 MS406 Computational Fracture Mechanics, Chair(s): Adrian Lew						
Solana Beach A	The H-Version of the Method of Auxiliary Mapping for Higher Order Solutions of Crack Problems	A Mesh Objective Algorithm for Modeling Mode-I Cracks Using Quadrilateral Finite Elements	Anisotropic Mesh Adaptation for Cracks in Brittle Materials with Phase Field Methods	A Local Phantom Node Approach for Crack Propagation and Fragmentation	Simulation of Brittle Fracture Propagation with Universal Meshes	
	Maurizio Chiaramonte*, Yongxing Shen, Adrian Lew	Damon Burnett*, Howard Schreyer	Stefano Micheletti*, Simona Perotto, Nicola Ferro, Marianna Signorini	Jessica Sanders*, Mike Puso	Adrian Lew*	
TS5 MS209 Advances in Turbulence-Resolving Computations and Applications to Complex Flows, Chair(s): Kenneth Jansen						
Solana Beach B	A Residual Based Variational Multi-Scale Method Formulation for Nondilute Polydisperse Turbidity Currents	Large Eddy Simulation Based on Residual-Based Variational Multiscale Formulation and Lagrangian Dynamic Smagorinsky Model	A Variational Multiscale Framework for Buoyancy Driven Natural Convection	Large-Eddy Simulation with Near-Wall Modeling Based on Weakly Enforced No-Slip Boundary Conditions		
	Fernando Rochinha*, Soulemayne Zio, Jos Camata, Gabriel Guerra, Henrique Costa, Renato Elias, Alvaro Coutinho	Steven Tran*, Onkar Sahni	Songzhe Xu*, Chenglong Wang, Ming-Chen Hsu, Baskar Ganapathysubramanian	Andres Tejada-Martinez*, Roozbeh Golshan, Yuri Bazilevs		
TS5 MS102 Folds, Twists and Bends: Differential Growth-induced Morphology in Biology and Physics, Chair(s): Krishna Garikipati						
Torrey Hills A	Computational Modeling of Cardiac Looping	The Mechanics of Airway Obstruction and Characterization of Folding in Chronic Lung Disease	Computational Aspects of Growth-Induced Instabilities			
	Larry Taber*, Yunfei Shi	Mona Eskandari*, Ellen Kuhl	Ali Javili*, Mona Eskandari, Berkin Dordivanlioglu, Ellen Kuhl, Christian Linder			

ROOM	02:00 PM	02:20 PM	02:40 PM	03:00 PM	03:20 PM	03:40 PM
TS5 MS904 Scalable Methods for Uncertainty Quantification						
Torrey Hills B	Sparse Polynomial Chaos Approximation with Gradient-Enhanced L1-Minimization	Enhancing Sparsity by Changing the Measure	Adaptive Spectral Tensor-Train Decomposition for Uncertainty Quantification	Uncertainty Quantification of High-Dimensional Complex Systems by Hybrid Polynomial Dimensional Decomposition Method		
	Ji Peng*, Jerrad Hampton, Alireza Doostan	Xiu Yang*, Huan Lei, Ramakrishna Tipireddy, Nathan Baker, Guang Lin	Daniele Bigoni*, Allan Engsig-Karup, Youssef Marzouk	Vaibhav Yadav*, Sharif Rahman		

Tuesday, July 28, Technical Session 6

ROOM	04:30 PM	04:50 PM	05:10 PM	05:30 PM	05:50 PM	06:10 PM
TS6 MS1003 Material Design and Material Optimization, Chair(s): Emilio Silva, Junji Kato						
Harbor G	Doing Topology Optimization Explicitly and Geometrically: A New Moving Morphable Components Based Framework	Effect of Annealing on Mechanical Properties of Polygraphene	Constitutive Modeling of Hydrogels and Nanocomposite Gels for Designing Layered Composite Structures			
	Xu Guo*, Weisheng Zhang, Wenliang Zhong	Matthew Becton*, Xianqiao Wang	Trisha Sain*, Muhammed Imam,			

TS6 MS105 Biomedical Fluid Mechanics and FSI, Chair(s): Tayfun Tezduyar

Harbor H	Immersogeometric Analysis with Application to Fluid-Structure Interaction of Heart Valves	Computational Fluid Dynamics of the Heart: Coupled Models for Blood Flows in the Left Ventricle	Computational Study of Airway Closure and Reopening in Crackle Lung Sounds	MRI-Based Computational Modeling of Blood Flow and Nanomedicine Deposition in Patients with Peripheral Arterial Disease	Cellular Scale Physiological Flow: Active Swimming Sperm Cells and Passive Flowing Red Blood Cells	Embolus Interactions With Blood Flow and Its Role in Stroke
	Ming-Chen Hsu*, Michael C. H. Wu, Fei Xu, Josef Kiendl, David Kamensky,	Luca Dede*, Antonello Gerbi, Alfio Quarteroni, Anna Tagliabue	Satoshi Ii*, Shigeo Wada	Shaolie Hossain*, Yongjie Zhang, Xiaoyi Fu, Greg Brunner, Jaykrishna Singh, Thomas Hughes, Paolo Decuzzi	Toshihiro Omori*, Takuji Ishikawa, Yohsuke Imai, Takami Yamaguchi	Debanjan Mukherjee*, Shawn C. Shadden

TS6 MS001 Minisymposium in Memory of Ted Belytschko: Advances in Meshfree, Particle, XFEM, GFEM, and Related Methods, Chair(s): J. S. Chen, W. K. Liu

Harbor I	Non-technical Presentations in Memory of Ted Belytschko
	W.K. Liu, J.T. Oden, T.J.R. Hughes, E. Ramm, S. Nemat-Nasser, P. Ladeveze, E. Onate, C. Farhat, R. de Borst, J. Fish, J.S. Chen

TS6 MS107 Recent Advances in Small-Scale Bio/Inorganic Interface Research

Bankers Hill	The Role of Interfacial Behavior on Extrafibrillar Matrix in Bone	Cell Responses to Rotational Nanoparticles				
	Liqiang Lin*, xiaowei Zeng, Xiaodu Wang	Liuyang Zhang*				

ROOM	04:30 PM	04:50 PM	05:10 PM	05:30 PM	05:50 PM	06:10 PM
TS6 MS709 Advances in Numerical Methods for Linear and Non-linear Dynamics, Chair(s): Gregory Hulbert						
Cortez Hill A	**Variational Methods for Consistent Mass Scaling and Direct Construction of Inverse Mass Matrices		Lie Group Variational Integrators for Spacecraft with Variable Speed Control Moment Gyros	Consistent Time Integration for Dynamics Across Numerical Interfaces Between Geometrically Exact Beams and Continuum Finite Elements		
	Manfred Bischoff*, Anne-Kathrin Schaeuble, Anton Tkachuk		Melvin Leok*, Taeyoung Lee, Frederick Leve, N. Harris McClamroch	Hui Liu*, Arun Prakash,		
TS6 MS710 Advances and Applications of the Generalized/Extended Finite Element Methods, Chair(s): Patrick O'Hara						
Cortez Hill B	A Generalized Finite Element Method Approach to Rigid Line Inclusions	The Partition of Unity Method as a Coupling Framework	An Enriched Conformal Decomposition Finite Element Method with Guaranteed Quality	Finite Elements for Accurate, Large-Scale Quantum Mechanical Materials Calculations: From Classical to Enriched to Discontinuous	Domain Decomposition and Multi-Scale Preconditioners for Heterogeneous Media Using Optimal Local Basis Functions	
	Angelo Simone*, Mohsen Goudarzi	Albert Ziegenhagel*, Marc Alexander Schweitzer, Sa Wu	David Noble*, Richard Kramer	John Pask*	Paul Sinz*, Robert Lipton	
TS6 MS901 Uncertainty Quantification Method for Complex Mechanics Models, Chair(s): Alireza Doostan						
Cortez Hill C	Random Sampling Strategies for Sparse Polynomial Chaos Expansions	Ensemble-Based Inverse Modeling and Its Application in Uncertainty Quantification of Turbulent Flow Simulations	A Large-Scale Ensemble Transform Method for Bayesian Inverse Problems Governed by PDEs	Two Approaches for Solving Stochastic Variational Inequality Problems in the Framework of Polynomial Chaos Expansions		
	Alireza Doostan*, Jerrad Hampton	Heng Xiao*, Jian-Xun Wang	Tan Bui-Thanh*, Aaron Myers, Kainan Wang	Jianyu Li*, Roger Ghanem		
TS6 MS1008 Modeling Materials with Coupled Physics (Thermo- Electro- Chemo- and Magneto-Mechanics), Chair(s): Sergey Kuznetsov						
Golden Hill A	Unified Thermo-Electro-Magneto-Mechanical Framework for Characterization of Multifunctional Materials	A Computational Framework for Polyconvex Large Strain Electro-mechanics				
	Sushma Santapuri*	Antonio J Gil*, Rogelio Ortigosa, Javier Bonet				

ROOM	04:30 PM	04:50 PM	05:10 PM	05:30 PM	05:50 PM	06:10 PM
TS6 MS112 Computational Modeling and Simulation of the Cardiovascular System, Chair(s): Alison Marsden						
Golden Hill B	Patient-Specific Cardiac Dynamics and Predictive Modeling for Cardiac Assist Device Engineering	Fluid-Structure Interaction Models of Natural and Prosthetic Heart Valves	Numerical Quantification of Hemodynamics and Wall Mechanics in Grafts of Coronary Artery Bypass Graft Surgery	Coupled Fluid-Chemical Computational Modeling of Anticoagulation Therapies in a Stented Artery	Computational Analysis of Energy Distribution of Coupled Blood Flow and Arterial Deformation	Effects of Cerebral Autoregulation and Collateral Flows on Intracranial Hemodynamics
	Michael W. Gee*, Marc Hirschvogel, Stephen N. Wildhirt	Boyce E. Griffith*, Amneet P. S. Bhalla	Abhay B. Ramachandra*, Andrew Kahn, Alison Marsden	Anirban Ghosh*, Rajat Mittal	Rana Zakerzadeh*, Paolo Zunino	Jaiyoung Ryu*, Xiao Hu, Shawn C. Shadden
TS6 MS303 Recent Progress in Multi-scale Modeling at the Intersection of Ab-initio Methods, Mechanics and Mathematics, Chair(s): Lin Lin						
Harbor ABC	Understanding Grain Boundary Embrittlement and its Correlation with Polycrystalline Tungsten Fracture	Extracting Coarse-Grained Dynamics of Extension Twinning in Magnesium Using Molecular Dynamics Simulations	A Thermal Noise Reduction Technique for Atomic Structure Analysis			
	Vikas Tomar*, Hongsuk Lee	Shailendra Joshi*	Akiyuki Takahashi*, Koya Nakamura, Kazuki Takahashi, Akiyoshi Nomoto			
TS6 MS701 Isogeometric Methods, Chair(s): T. Kvamsdal						
Harbor DEF	Truncated Hierarchical Catmull-Clark Subdivision with Local Refinement	Truncated T-Splines	Rhino 3D to Abaqus Design-Through-Analysis: T-spline Based Isogeometric Analysis Software Solution	Weighted T-Spline and its Application in Isogeometric Analysis	IGA Suitable Planar Domain Parameterization with THB-Splines	Analysis-Suitable Adaptive T-Mesh Refinement with Linear Complexity
	Yongjie Zhang*, Xiaodong Wei, Thomas Hughes, Michael Scott	Xiaodong Wei*, Yongjie Zhang	Yicong Lai*, Joshua Chen, Lei Liu, Yongjie Jessica Zhang, Eugene Fang, Jim Lua	Lei Liu*, Yongjie Zhang	Jaka peh*, Antonella Falini, Bert Jttler	Philipp Morgenstern*, Daniel Peterseim
TS6 MS310 Multiscale Simulation for Failure and Uncertainty Quantification in Engineering Applications, Chair(s): John Emery						
Hillcrest C	Mechanistically Based Probabilistic Modeling Compared to Statistical Modeling for Fatigue	Towards Modeling of Failure in Polycrystalline Ti Alloys Under High Rate of Deformation Using Crystal Plasticity FEM	Multi-Scale Treatment of the Effects of Temperature and Strain-Rate on the Plasticity of BCC Refractory Metals	Micro-Mechanical Study of High Cycle Fatigue in Polycrystalline Metals Using Energy Method		
	Gary Harlow*	Ahmad Shahba*, Xiaohui Tu, Somnath Ghosh	Corbett C. Battaille*, Hojun Lim, Christopher Weinberger	Mehdi Naderi*, Mehdi Amiri, Nagaraja Iyyer, Nam Phan, Peter Kang		

ROOM	04:30 PM	04:50 PM	05:10 PM	05:30 PM	05:50 PM	06:10 PM
TS6 MS203 International Symposium of High-order Methods for Computational Fluid Dynamics, Chair(s): David Kopriva						
Hillcrest D	Hermite WENO Schemes with Strong Stability Preserving Multi-Step Temporal Discretization Methods for Conservation Laws	The Dynamics of Error and Rate of Convergence for High-Order Flux Reconstruction	High-Order Simulation of the Convection and Differential Rotation in Rapidly Rotating Stars	A Phase-Field Method for Simulation of Two-Phase Flow Induced Pipe Vibration	Direct Numerical Simulation of Shock-Wavy-Wall Interaction by High-Order Spectral Difference Methods	
	Xiaofeng Cai*, Jun Zhu, Jianxian Qiu	Jerry Watkins*, Kartikey Asthana, Antony Jameson	Junfen Wang*, Chunlei Liang	Xiaoning Zheng*, George Karniadakis	Guido Lodato*, Luc Vervisch, Paul Clavin	
TS6 MS505 Advances in Topological Optimization with Application to Advanced Manufacturing, Chair(s): Miguel A. Aguilo						
Mission Beach A	Topology Optimization for 3D Printed Active Composites	High-Resolution Microstructural Design for Additive Manufacturing	Multifunctional Optimization for Additive Manufacturing Through Combined Topology Optimization and System Design	Topology Optimization for Additive Manufacturing: Incorporating Printer Capabilities to Reduce Post-Processing and Maximize Performance		
	Kurt Maute*, A. Tkachuk, M. Geiss, J. Wu, J. Qi, M. Dunn	Krishnan Suresh*	Ian Ashcroft*	Andrew Gaynor*, James Guest		
TS6 MS408 Computational Modeling of Extreme Loading Environments, Chair(s): Robert M. Ferencz						
Mission Beach B	**Advances in Second-Order Finite Elements for Explicit Methods in Non-Linear Solid Dynamics		A Molecular Dynamics Study of the Role of Microstructure on the FCC to BCC Phase Transformation During Shock of Nanocrystalline Copper	Atomistic Simulation of Initiation in Hexanitrostilbene		
	Kent Danielson*		Mehrdad Sichani*, D. Spearot	Tzu-Ray Shan*, A. Thompson, R. Wixom, C. Yarrington		
TS6 MS503 Model and Solution Reduction Methods for Direct and Inverse Problems in Computational Mechanics, Chair(s): Simona Perotto						
Mission Beach C	Advanced Techniques for Coupling Domains for Generalized Solutions Computed by the Proper Generalized Decomposition	PGD Reduced Models for Real-Time Model Updating Using Modified CRE and Kalman Filtering	On Large Scale Inverse Problems that Cannot Be Solved	Coupling Reduced Basis Methods and the Landweber Method to Solve Inverse Problems with a High-Dimensional Parameter Space	Reduced Basis Method for Variational Inequalities in Contact Mechanics	
	Antonio Huerta*, Enrique Nadal, Francisco Chinesta	Ludovic Chamoin*, Basile Marchand, Christian Rey	Eldad Haber*	Dominik Garmatter*, Bastian Harrach, Bernard Haasdonk	Zhenying Zhang*, Karen Veroy	

ROOM	04:30 PM	04:50 PM	05:10 PM	05:30 PM	05:50 PM	06:10 PM
TS6 MS905 Stochastic Methods in Computational Mechanics of Random Materials, Chair(s): Lori Graham-Brady						
Ocean Beach	Direct Simulation of Higher-Order Stochastic Material Morphologies	Microstructure Characterization and Reconstruction: A Supervised Learning Approach	Stochastic Continuum Modeling of Random Interphases Based on Atomistic Simulations: Application to a Nanoreinforced Polymer	Probabilistic Descriptions of Mesoscale Material Properties Fields using the Principle of Maximum Entropy	Stochastic Analysis of Mesoscopic Elasticity Random Fields Obtained by Filtering Framework	
	Michael Shields*, Hwanpyo Kim	Ramin Bonstanabad*, Anh Bui, Wei Xie, Daniel Apley, Wei Chen	Johann Guilleminot*, Thinh Le, Christian Soize	Sarah Baxter*, Katherine Acton	Vinh Tran*, Johann Guilleminot, Sebastien Brisard, Karam Sab	
TS6 MS205 Free and Moving Boundary: Methods and Applications, Chair(s): Scott Roberts						
Pier	An Extended Finite Volume Method for Particulate Flow of Bio-Fluids	Movement of Sheet Material in Rolling Pair	A Fully-Implicit Approach to Phase-Field Modeling of Dendritic Solidification	High-Order Adaptive Deforming Mesh Calculations of Silicon Solidification with Kinetics		
	Susanne Hilbacher*, Gabriel Wittum	Gayrat Bahadirov*	Chris Newman*, Marianne Francois	Brian Helenbrook*		
TS6 MS307 Multiscale Modeling and Simulation of Fracture and damage in quasi-brittle solids						
Promenade A	Influence of the Fracture Process on the Mechanical Behaviour of the Metal Matrix Composites	Modeling Damage and Thermal Effects in Composite Materials Using an Enrichment Based Multi-Scale Method	A Micromechanical Multi-Scale Damage-Friction Model for Initially Anisotropic Materials	Multi-Scale Modeling of Heterogeneous Infrastructure Materials Subjected to Viscoelastic Deformation and Rate-Dependent Fracture	A Multi-Scale Approach to Modeling Intergranular Fracture Process in Metallic Alloys	
	Jos Pituba*, gatha Florncio, Gabriela Fernandes, Eduardo Souza Neto	Andrew Littlefield*, Michael Macri	Mei Qi*, Albert Giraud, Jianfu Shao, Jean-Baptiste Colliat	Yong-Rak Kim*, Jamilla Emi Sudo Teixeira, Flavio Souza, Taesun You, David Allen	Benyamin Gholami Bazehhour*, Kiran N. Solanki, Jay Oswald	
TS6 MS706 Advancement in Hydrocodes, Chair(s): Guglielmo Scovazzi						
Promenade B	An Embedded/Immersed Boundary Type Coupling of Overlapping Lagrangian and Eulerian/ALE Meshes	On Godunov-Type Methods for Computing Compressible Two-Phase Flows	A High-Order Discontinuous Galerkin Approach for Hydro Simulations of Strong Shocks and Material Interfaces	CRKSPH: A Conservative Reproducing Kernel Smoothed Particle Hydrodynamics Scheme		
	Mike Puso*, Ed Kokko, Ben Liu, Brian Simpkins	Igor Menshov*	Eric Johnsen*, Marc Henry de Frahan, Mauro Rodriguez	Cody Raskin*		

ROOM	04:30 PM	04:50 PM	05:10 PM	05:30 PM	05:50 PM	06:10 PM
TS6 MS209 Advances in Turbulence-Resolving Computations and Applications to Complex Flows, Chair(s): Michel Rasquin						
Solana Beach B	**Modeling Strategies of Active Flow Control Applied to a Realistic Wing Design		Large Eddy Simulation of Unsteady Combustion Events	DNS of Turbulent Mixing Between Fluids of Different Densities		
	K.E. Jansen*, M. Rasquin		Malik Hassanaly*, Venkat Raman	Eric Johnsen*, Pooya Movahed, Shaowu Pan		
TS6 MS102 Folds, Twists and Bends: Differential Growth-induced Morphology in Biology and Physics, Chair(s): Ellen Kuhl						
Torrey Hills A	A Mechano-biological Approach to Relate Neurodevelopmental Processes to Brain Morphology	Computational Study of Cortical Convolution Patterns in a Developing Brain	Microtubule Buckling In Platelet Morphogenesis	Morphological Transitions of Macromolecular Aggregates	Mechanical Basis of Seashell Morphology	Patterning and Growth in Developmental Biology
	Silvia Budday*, Paul Steinmann, Ellen Kuhl	Xianqiao Wang*, Mir Jalil Razavi, Tuo Zhang, Tianming Liu	Wylie Stroberg*, Miguel Bessa, Wing Kam Liu, Seth Lichter	William Klug*, Luigi Perotti, Sanjay Dharmavaram, Joe Rudnick, Robijn Bruinsma	Derek Moulton*, Alain Goriely, Rgis Chirat	Krishna Garikipati*, Gregory Teichert, Alain Goriely, Derek Moulton
TS6 MS904 Scalable Methods for Uncertainty Quantification						
Torrey Hills B	Preconditioned MCMC and Adaptive Posterior Refinement Leveraging Sparse Polynomial Chaos	High-Dimensional Bayesian Inference with Tensors	Advances in High-Dimensional Computational Measure Theory for Inverse Problems	Gaussian Functional Regression for Output Prediction with Mathematical Models and Physical Observations	Parallel RBF Kernel-Based Stochastic Collocation for Large-Scale Random PDEs	
	Michael Eldred*, John Jakeman, Laura Swiler	Alex Gorodetsky*, Youssef Marzouk	Troy Butler*	Cuong Nguyen*, Jaime Peraire	Peter Zaspel*, Michael Griebel, ,	

Plenary Speaker, Wednesday, July 29, 2015

9:00 – 9:45 am, Harbor Ballroom

A Particle-Discrete-Finite Element Method for Analysis of Particulate Flows and Their Interaction with Structures

Eugenio Oñate

Abstract: (with Miguel A. Celigueta, Guillermo Casas, Riccardo Rossi, F. Zarate and Sergio Idelsohn; International Center for Numerical Methods in Engineering (CIMNE))

We present recent developments in the integration of the Particle Finite Element Method (PFEM, www.cimne.com/pfem) [1] and the Discrete Element Method (DEM, www.cimne.com/dempack) for analysis of coupled problems in mechanics involving particulate flows and their interaction with structures. The so called PDFEM uses a unified updated Lagrangian description to model the motion of material points in a domain containing a fluid and a variety of solids (such as particles of different sizes and rigid or deformable structures) [1,2]. A mesh connects the material points defining the discretized domain where the governing equations for each of the constituent materials are solved as in the standard FEM. Both a moving mesh and a fixed mesh PFEM procedure can be used for solving the equations of continuum mechanics for both fluids and solids using the FEM. For the fixed mesh approach the information of the material points is mapped at each time step onto the nodes of the mesh where the governing equations are solved with the FEM [3].

For free-surface flows a moving mesh technique is used where the mesh is regenerated at every time step in order to obtain good quality meshes accounting for large distortions in the fluid domain. We use a new parallel mesh generation procedure that reduces considerably the computational time of the overall solution process

Large discrete particles within the fluid are treated as rigid or deformable bodies which interact with each other “a la DEM” via adequate frictional contact laws. A boundary-fitted fluid mesh is generated around each discrete particle at each time step. The motion of large discrete particles is governed by the particle weight, the fluid force and the contact forces. Smaller discrete particles are immersed in the fluid mesh and their motion and coupled interaction with the fluid is modeled using standard techniques for particulate flows.

We describe the procedures to model frictional contact conditions between the interacting bodies within the fluid and material erosion at fluid-solid and solid-solid interfaces.

We present several examples of application of the PDFEM to fluid-soil-structure interaction problems such as the motion of small and large particles in water streams, the erosion, transport and deposition of soil particles in fluids, the stability of breakwaters under sea waves, the falling of landslides on houses and into reservoirs, underwater excavation and drilling problems in tunneling and oil and gas engineering, the failure of rockfill dams in overspill situations and a number of industrial problems involving particulate flows.

[1] E. Oñate, M.A. Celigueta, S.R. Idelsohn, F. Salazar, B. Suárez. Possibilities of the particle finite element method for fluid–soil–structure interaction problems. *Computational Mechanics*, 48: 307-318, 2011.

[2] E. Oñate, M.A. Celigueta , S. Latorre, G. Casas, R. Rossi and J. Rojek. Lagrangian analysis of multiscale particulate flows with the particle finite element method, *Computational Particle Mechanics*, Vol. 1, pp. 85-102, 2014

[3] P. Becker, S.R. Idelsohn and E.Oñate. A monolithic unified approach for FSI and multi-fluid flow problems using the Particle Finite Element Method with fixed mesh, to be published in *Computational Mechanics*, 2015.

Biography: Prof. EUGENIO OÑATE, Civil Engineer by the Technical University of Valencia, Spain (1975) and Ph.D. by the University of Swansea, Wales, UK (1979), Director of the School of Civil Engineering of Barcelona (1983-89), founder and director of the International Center for Numerical Methods in Engineering (CIMNE, www.cimne.com) of the Technical University of Catalonia (since 1987), Honorary President of the Spanish Society of Numerical Methods in Engineering (SEMNI) (since 2004), Past-President of the European Community on Computational Methods in Applied Sciences (ECCOMAS) (2000-2004) and Past-President of the International Association for Computational Mechanics (IACM) (2002-2010). He has received a number of awards from universities and scientific and technological organisations worldwide. He is editor of three international journals and author of two text books and some 300 scientific papers on developments and applications of finite element and particle-based methods for structural and geomechanical problems, fluid dynamics, fluid-soil-structure interaction and industrial forming processes. For details see www.cimne.com/eo

Semi-Plenary Speaker, Wednesday, July 29, 2015

1:00 – 1:45 pm, Harbor ABC

Goal-Oriented Error Estimation in Computational Sciences and Engineering

Serge Prudhomme, Ecole de Polytechnique de Montréal

Abstract: About two decades have passed since the first works on goal-oriented error estimation for finite element approximations of boundary-value problems or for adaptive modeling have been published in the literature. The concepts for estimation and control of errors in quantities of interest are now well understood and have been extended to a large number of discretization methods (finite-volume, finite-difference, discontinuous Galerkin methods, etc.) and applied to a wide range of model problems (elliptic, parabolic, hyperbolic equations). Nevertheless, the methodology still presents challenges, for instance, in the case of time-dependent problems, non-linear problems, or coupled problems. In this presentation, we will review the concepts of goal-oriented error estimation, describe challenges associated with non-linear problems and coupled problems, and show how these concepts can be extended to predictive modeling.

Biography: Serge Prudhomme joined the Department of Mathematics and Industrial Engineering at Ecole Polytechnique de Montréal in 2012. Prior to his appointment at Poly Montréal, he held positions at the Institute for Computational Engineering and Sciences at The University of Texas at Austin, first as research associate from 2001 to 2004, then as research scientist. His research interests cover a wide range of topics in computational engineering and sciences, but have long focused on the development of reliable and efficient computational methods for the prediction of physical phenomena. He is generally interested in a posteriori error estimation and adaptive methods for numerical approximations of partial differential equations and has contributed to the development of so-called goal-oriented methods to control discretization and modeling errors. These adjoint-based approaches have been applied, for example, to the simulation of multiscale problems for selection of the regions in which fine-scale and coarse-scale models should be used. He has been working more recently on the development of verification and validation processes for predictive simulation-based engineering and science. Serge Prudhomme has published more than 50 peer-reviewed articles and book chapters in scientific journals and has given more than 75 invited talks and short courses at international conferences and workshops. He graduated from Ecole Centrale de Lille, France, in 1991 with a diploma in engineering and received an M.Sc. in Mechanical and Aerospace Engineering from the University of Virginia, USA, in 1992. He then earned a Ph.D. in 1999 in Aerospace Engineering from The University of Texas at Austin.

Semi-Plenary Speaker, Wednesday, July 29, 2015

1:00 – 1:45 pm, Harbor DEF

Patient Specific Modeling in Cardiovascular Disease: From Computation to Clinic

Alison Marsden, Stanford University

Abstract: Cardiovascular disease is the leading cause of death worldwide and the number one killer of both men and women in the United States. In children, congenital heart defects are the number one cause of infant deaths in the US, affecting roughly one out of every 100 births, with more than 50% of patients requiring at least one invasive surgery during their lifetime. Numerous advances in the treatment of adult and pediatric cardiovascular disease have arisen from partnerships between engineers and clinicians. Over the past decade, cardiovascular blood flow simulation has proven to be one of the most dynamic examples of this critical partnership, already having led to paradigm shifts in clinical practice. Cardiovascular simulations fill several crucial gaps in current clinical capabilities. First, while predictive simulations are now routinely used in aerospace and other engineering industries, the medical field still relies primarily on statistical outcomes data and trial and error approaches to advance surgical methods and device technologies. Simulations now offer a powerful means to predict the outcome of surgeries, systematically test and optimize new surgical approaches and devices, and to personalize treatments for individual patients. Second, and perhaps equally importantly, simulations can be used to characterize the *in vivo* mechanical environment, providing key hemodynamics and mechanical stimuli data that cannot be readily obtained from medical imaging. These data are a key component of the mechanobiological puzzle relating the mechanical environment to subsequent disease progression. In this talk, I will discuss recent methodological advances that have increased the fidelity and clinical utility of cardiovascular simulations. I will then present examples that illustrate the clinical impact of these tools, including (1) novel surgical approaches for treatment of children with single ventricle heart defects, and (2) patient specific simulations of vein graft failure mechanisms in coronary artery bypass graft patients. Finally, I will discuss future challenges for numerical simulation and clinical translation in pediatric and adult cardiovascular disease.

Biography: Alison Marsden is currently an associate professor and Jacobs Faculty Fellow in the Mechanical and Aerospace Engineering Department at the University of California San Diego. She graduated with a bachelor's degree in Mechanical Engineering from Princeton University in 1998, and a PhD in Mechanical Engineering from Stanford in 2005 working with Prof. Parviz Moin. She was a postdoctoral fellow at Stanford University in Bioengineering and Pediatric Cardiology from 2005-07 working with Charles Taylor and Jeffrey Feinstein. She was the recipient of an AHA beginning grant in aid award, a Burroughs Wellcome Fund Career Award at the Scientific Interface, an NSF CAREER award, and is a member of an international Leducq Foundation Network of Excellence. She received the UCSD graduate student association faculty mentor award in 2014. She has published over 60 peer reviewed journal papers, and has received funding from the NSF, NIH, and several private foundations. Her work focuses on the development of numerical methods for simulation of cardiovascular blood flow problems, medical device design, application of optimization to large-scale fluid mechanics simulations, and use of engineering tools to impact patient care in cardiovascular surgery and congenital heart disease.

Wednesday, July 29, Technical Session 7

ROOM	10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM	11:40 AM
TS7 MS1001 Microstructure-Governed Material Deformation: Theoretical and Computational Methods, Models and Outcomes, Chair(s): Reese Jones						
Harbor G	**Microstructure Change and Interface Motion As Problems of Evolving Material Configurations		Modeling Polycrystalline Materials via a Novel Nonlocal Lattice Particle Framework	A Variational Approach to Crystalline Interfaces: A New Method for Predicting Morphology and Relaxed Interface Energy	Developing Methods to Effectively Compare Atomistic Simulations of Dislocations and Dislocation Interactions	
	Gregory Teichert*, Krishna Garikipati		Hailong Chen*, Yang Jiao, Yongming Liu	Brandon Runnels*, Irene Beyerlein, Michael Ortiz	Lucas Hale*, Chandler Becker, Yuri Mishin,	
TS7 MS202 Flows with Moving Boundaries and Interfaces, Chair(s): Ming-Chen Hsu						
Harbor H	Computation of Free Surface Flow with Transversely Oscillating Cylinder	Application of a Discrete Vortex Method to Analyze the Vortex Flow Induced by an Oscillating Flat Plate	The Long Time Dynamics Behavior of Richtmyer-Meshkov Instability and Turbulent Mixing			
	Serpil Kocabiyik*, Oleg Gubanov	Yusuke Kunii*	Tao Wang*			
TS7 MS001 Minisymposium in Memory of Ted Belytschko: Advances in Meshfree, Particle, XFEM, GFEM, and Related Methods, Chair(s): Dongdong Wang						
Harbor I	A Multi-Scale Particle Method with Concurrent MD, DPD and MPM	Quasi-Linear RKPM and Its Application to Large Deformation and Fragmentation Modeling	On the Construction of Mesh-Free, Finite-Volume Particle Methods for High-Order Numerical Flow Simulation	Calculation of Stress Intensity Factor Using Meshfree Method with Dynamic Bubble System	Spatial Fractional Advection-Dispersion Equation Based on A Meshfree Method	Towards a Stabilized Meshfree Formulation for Hydraulic Fracturing Simulation
	Zhen Chen*	Edouard Yreux*, J. S. Chen	Armin Iske*	Seiya Hagihara*, Yutaka Hayama, Shinya Taketomi, Yuichi Tadano	Yanping Lian*, Gregory J. Wagner, Wing Kam Liu	Haoyan Wei*, J. S. Chen
TS7 MS101 Topics in Computational Biomechanics, Chair(s): Pierce, Grytz						
Bankers Hill	A Framework for the Characterization and Population Averaging of Full Mitral Valve Geometry	Transient Analysis of Airway Lung Tissue Under Mechanical Ventilation	Capturing the Role of Fiber Orientation in Drug-Induced Cardiac Electro-Mechano-Physiology	On a Multi-Scale and Multi-Phase Model for the Description of Liver Perfusion and Metabolism		
	Amir Khalighi*, Andrew Drach, Chung-Hao Lee, Michael Sacks	Ramana Pidaparti*, Israr Mohammad, Parya Aghasafari	Khalil Elkhodary*, Noha Shalabi, Nejib Zemzemi	Daniel Werner*, Tim Ricken, Hermann-Georg Holzhtter, Matthias Knig, Uta Dahmen , Olaf Dirsch		

ROOM	10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM	11:40 AM
TS7 MS709 Advances in Numerical Methods for Linear and Non-linear Dynamics, Chair(s): Gregory Hulbert						
Cortez Hill A	**New High-Order Accurate Isogeometric Elements with Reduced Dispersion for Wave Propagation Problems		The Interplay Between Integration and Interpolation Errors in Finite Element Simulation of Wave Propagation	Asynchronous Space-Time Algorithm for Computational Structural Dynamics	Optimally Blended Finite-Spectral Element Scheme for High Wavenumber Vibroacoustics	A Survey of Errors in Finite-Element Computations of Wave Propagation
	Alexander Idesman*		Murthy Guddati*, Ali Vaziri Astaneh, Vladimir Druskin	Waad Subber*, Karel Matous	Michael Jandron*, Jeffrey Cipolla, Mark Ainsworth	Stephen Beissel*
TS7 MS710 Advances and Applications of the Generalized/Extended Finite Element Method, Chair(s): Angelo Simone						
Cortez Hill B	Application of the Generalized Finite-Element Method to Crack Coalescence Simulations Utilizing Fixed, Coarse Finite-Element Meshes	A New Formulation for Imposing Dirichlet Boundary Conditions on Non-Matching Meshes	A Robust Nitsches Formulation for Interface Problems with Application to the Surfactant-Driven Fracture of Particle Rafts	Capturing Multi-Scale Thermo-Structural Effects with a Parallel Generalized Finite Element Method	A Multi-Scale Generalized FEM for the Simulation of Spot Welds in Large Structures	
	Patrick O'Hara*, Piyush Gupta, Armando Duarte	Alejandro M. Aragn*, Aurelia Cuba-Ramos, Soheil Soghrati, Philippe H. Geubelle, Jean-Franois Molinari	Yingjie Liu*, John Dolbow, Mahesh Bandi, Eliot Fried	Julia Plews*, C. Armando Duarte	Haoyang Li*, C. Armando Duarte	
TS7 MS901 Uncertainty Quantification Method for Complex Mechanics Models, Chair(s): Paul Constantine						
Cortez Hill C	Active Subspaces for Dimension Reduction	A New Tensor-Based Decomposition of Spatiotemporal Random Processes	A Christoffel Function Weighting Algorithm for Least-Squares Collocation Approximation	Clinical Data-Aware Uncertainty Analysis of Multi-Scale Cardiovascular Models		
	Paul Constantine*	Debraj Ghosh*, Anup Suryawanshi	Akil Narayan*, John Jakeman, Tao Zhou	Daniele E. Schiavazzi*, Justin S. Tran, Giancarlo Pennati, Tain-Yen Hsia, Alison L. Marsden		
TS7 MS601 Enabling Software and Hardware Technologies Towards Exascale, Chair(s): William Barth						
Cove	**Enabling Large-Scale Complex Predictions Using Open-Source Software Elements		Using Workflow Provenance Data to Analyze Performance Data of Numerical Methods	Enabling Complex Applications on Heterogeneous Clusters with OmpSs MPI Offloading	Development of a Failure Analysis System of RC Structures Subjected to Dynamic Wave Impacts	
	Paul Bauman*, Roy Stogner		Marta Mattoso*, Renan Souza, Vitor Silva, Danilo Costa, Alvaro Coutinho	Vicen Beltran*, Jesus Labarta	Seizo Tanaka*, Fangtao Sun, Muneo Hori, Tsuyoshi Ichimura, Maddegedara Wijerathne	

ROOM	10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM	11:40 AM
TS7 MS1008 Modeling Materials with Coupled Physics (Thermo- Electro- Chemo- and Magneto-Mechanics), Chair(s): Sergey Kuznetsov						
Golden Hill A	OOF: A Materials Science Focused Finite Element System	Thermomechanical and Electromechanical Analysis of Dislocations and Plasticity	A Non-Linear, Phase-Field Model of Lithium Dendritic Growth on the Anode of a Lithium Ion Battery			
	Andrew Reid*, Stephen Langer, Gunay Dogan, Shahriyar Keshavarz, Yannick Congo	Robert Gracie*, Oxana Skiba	Lei Chen*, Long-Qing Chen, James Chen,			
TS7 MS112 Computational Modeling and Simulation of the Cardiovascular System, Chair(s): William Klug						
Golden Hill B	A Novel Chemo-Mechano-Biological Mathematical Model of Arterial Tissue Growth and Remodeling: Modelling of Signalling Pathways Governing Adventitial Adaptive Response	Combining 2-D and 3-D Image Segmentation Techniques Using Triangulated Surface Boolean Operations	Work Heterogeneity Predicts Patient Response in Cardiac Resynchronization Therapy	Influence of Arterial Wall Properties on Simulation of Pulse Wave Propagation in a 1D Network Model		
	Pedro Aparicio*, Thomas Rahman, Mark Thompson, Paul Walton	Adam Updegrafe*, Nathan Wilson, Shawn Shadden	Adarsh Krishnamurthy*, Christopher Villongco, Jeffrey Omens, Andrew McCulloch	Muhammad Qureshi*, Christina Battista	Xiao Liao*, Jay Oswald	
TS7 MS807 Stabilized and Multiscale Methods for Interface Mechanics, Chair(s): Timothy Truster						
Hillcrest A	Nitsche Methods for Plate Bending	On the Numerical Treatment of Fine-Scale Interface Variables in Multi-Scale Interface Formulations	Variationally Consistent Coupling of Non-Matching Finite-Element and Meshfree Discretizations	Modeling Delamination in Composites Under Dynamic Loading Using a Stabilized Discontinuous Galerkin Approach		
	Isaac Harari*	Ghadir Haikal*, Layla Amaireh	Xiaowo Wang*, Arun Prakash	Timothy Truster*, Wesley Hicks		

ROOM	10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM	11:40 AM
TS7 MS902 Model Error Assessment in Computational Physical Models, Chair(s): Habib Najm						
Hillcrest B	Density Estimation Framework for Model Error Assessment	Calibrating Model Errors in Multidisciplinary Analyses Using Time-Dependent Data	The ROMES Method for Statistically Quantifying Reduced-Order-Model Error	Parameterisation Estimation Using Data Assimilation	Optimal Experimental Design in the Presence of Nuisance Parameters and Model Error	
	Khachik Sargsyan*	Erin DeCarlo*, Sankaran Mahadevan, Benjamin Smarslok	Kevin Carlberg*, Martin Drohmann	Philip Browne*, Matthew Lang, Peter Jan Van Leeuwen	Chi Feng*, Youssef Marzouk	
TS7 MS310 Multiscale Simulation for Failure and Uncertainty Quantification in Engineering Applications, Chair(s): Joseph Bishop						
Hillcrest C	Distribution-Enhanced Homogenization Framework and Model for Heterogeneous Elasto-Plastic Problems	Simulation of Fractographic Features in Glass with Multi-Scale Peridynamics	Peridynamic Modeling of Dynamic Brittle Failure in Polycrystalline Ceramics			
	Somnath Ghosh*, Coleman Alleman, Curt Bronkhorst, DJ Luscher	Stewart Silling*, Florin Bobaru, Yenan Wang	Guanfeng Zhang*, Yenan Wang, Florin Bobaru			
TS7 MS203 International Symposium of High-order Methods for Computational Fluid Dynamics, Chair(s): Guido Lodato						
Hillcrest D	Implicit Large-Eddy Simulations of Single and Counter-Rotating Vertical-Axis Wind Turbines in the Low-Reynolds Regime Using a High-Order DG Method	Adjoint-Based Mesh Adaptation for the 3D Navier-Stokes Equations	Shock-Capturing with AMR and Artificial Viscosity on Moving Grid	The Parallel Wavelet Adaptive Multi-Resolution Representation (pWAMR) Method	DG-FTLE: Lagrangian Coherent Structures with High-Order Discontinuous-Galerkin Methods	
	Samuel Kanner*, Per-Olof Persson, Luming Wang	Lei Shi*, Z.J. Wang	Jingjing Yang*, Chunlei Liang	T. Grenga*, S. Paolucci	Daniel Nelson*, Gustaaf Jacobs	

ROOM	10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM	11:40 AM
TS7 MS505 Advances in Topological Optimization with Application to Advanced Manufacturing, Chair(s): Joshua Robbins						
Mission Beach A	Multi-Scale Concurrent Material-Topology Optimization Using a Level-Set Method	A Gradient Based Approach for Reliability Based Design Optimization via Stochastic Expansion Methods	Designing with Topology Optimization	Topology Optimization to Enable Qualification of Additively Manufactured Components	A Second-Order Accurate Mathematical Optimization Algorithm Fully Based on First-Order Information	Constrained Topology Optimization Using Multi-Point Perturbations of Global Variables
	H. Alicia Kim*, Peter Dunning	Vahid Keshavarzzadeh *, Daniel Tortorelli	Brett W. Clark*	Joshua Robbins*, Thomas Voth	Miguel A. Aguilo*	Willem Roux*
TS7 MS408 Computational Modeling of Extreme Loading Environments, Chair(s): Kent T. Danielson						
Mission Beach B	Assessing Structural Response to Intense Loading Environments	Pressure Transferable Coarse-Grained Potentials for Polyethylene	Computational and Experimental Investigations of an Explosively-Driven Shock Tube	A Constitutive Model for the Thermomechanical Response of Polyurea Under Large Deformations and High Strain Rates	Study on Damage Evolution Dynamics for the Spall Fracture of Ductile Metal	
	Robert Ferencz*, Anthony DeGroot, James Durrenberger, Jerry Lin, Michael Puso, Jessica Sanders, Robert Sherwood, Edward Zywicz	Vipin Agrawal*, Jay Oswald	Joel Stewart*, Collin Pecora	Xiao Liao*, Jay Oswald, Alireza Amirkhizi	Xiaoyang Pei*	
TS7 MS503 Model and Solution Reduction Methods for Direct and Inverse Problems in Computational Mechanics, Chair(s): Alessandro Veneziani						
Mission Beach C	**Reduced Basis Methods for Non-Local Diffusion Problems with Random Input Data		Beam and Plate Modeling: An Approach Based on Dimension Reduction	Model-Order Reduction Of Dynamic Simulation Of Flexible Beams Undergoing Large Rotations	Numerical Approximation of PDEs Based on Compressed Sensing	
	Max Gunzburger*		Giuseppe Balduzzi*, Ferdinando Auricchio, Carlo Lovadina	Amar Gaonkar*, Salil Kulkarni	Simone Brugiapaglia*, Stefano Micheletti, Fabio Nobile, Simona Perotto	
TS7 MS905 Stochastic Methods in Computational Mechanics of Random Materials, Chair(s): Michael Shields						
Ocean Beach	Influence of Microplasticity in Metal Foams on Macroscopic Damping Behavior	Plastic Strain Driven Stochastic Volume Elements for Polycrystalline Materials	Uncertainty Quantification of Lithium-Ion Batteries			
	Maximilian Geissendoerfer*, Carsten Proppe	Kirubel Teferra*, Lori Graham-Brady	Mohammad Hadigol*, Alireza Doostan, Kurt Maute			

ROOM	10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM	11:40 AM
TS7 MS205 Free and Moving Boundary: Methods and Applications, Chair(s): Elie Hachem						
Pier	Modeling of Free Surface Flow and Slamming Using Smoothed Reproducing Kernel Particle Method	Boundary Integral Formulation for Asymmetric Impinging Wall Jets with Arbitrary Nozzles	Fluid Structure Interaction Between Elastic Thin Shell and Multiphase Flow	A Hybrid ALE-CDFEM Approach to Modeling Foaming in Punch Molds		
	Chien-Ting Sun*, Pai-Chen Guan	Do Wan Kim*, Sung Sic Yoo, Wing Kam Liu	P. Randall Schunk*, Kristianto Tjiptowidjojo, Andrew Cochrane	Rekha Rao*, David Noble, Scott Roberts, James Tinsley		
TS7 MS307 Multiscale Modeling and Simulation of Fracture and Damage in quasi-brittle solids						
Promenade A	**The SCEC-USGS Dynamic Earthquake Rupture Code Comparison Exercise Large Earthquake Simulations	Stochastic-Dynamic Earthquake Models and Tsunami Generation	Dynamic Gouge Compaction and Dilatancy as a Simple Mechanism for Fault Zone Weakening and Short-Duration Slip Pulses	Spacetime Simulation of Seismic Response	Implementation of Complex Friction Laws in ABAQUS for Earthquake Dynamic Rupture Simulations	
	Ruth Harris*	David Oglesby*, Eric Geist	Shuo Ma*, Evan Hirakawa	Ian McNamara*, Robert Haber, Ahmed Elbanna, Reza Abedi	Xiao Ma*, Ahmed Elbanna	
TS7 MS711 Polygonal and Polyhedral Discretizations in Computational Mechanics, Chair(s): Manzini						
Promenade B	**VoroCrust Algorithm: 3D Polyhedral Meshing with True Voronoi Cells Conforming to Surface Samples	Polyhedral FEM: Computational-Geometry Aspects	What is a Good Linear Finite Element... On a Generic Polytope?	A Hybrid Higher-Order Numerical Scheme for Convection-Diffusion Problems on Generic Grids		
	Mohamed Ebeida*, Ahmed Mahmoud, Ahmad Rushdi, Scott Mitchell, Chandrajit Bajaj, John Owens	Mark Rashid*	Andrew Gillette*, Alexander Rand	Jerome Droniou*, Daniele Di Pietro, Alexandre Ern		
TS7 MS409 Computational and Experimental Investigation of Manmade and Natural Disasters, Chair(s): Jesse Sherburn						
Solana Beach A	**Modeling Projectile Penetration Mechanics in a Mesh-Free Computational Framework	Analysis of Impact Penetration Using a Lagrangian Particle Formulation	Using Fracture Toughness Tests in a Multi-Scale Modeling Framework for Application to Concrete Penetration/Perforation Modeling	Modeling of Wave-Induced Slump Using Reproducing Kernel Particle Method	Stability Analysis of Meshfree Methods for Landslide Simulations	
	Michael Roth*, Jesse Sherburn, Thomas Slawson, J. S. Chen, Michael Hillman	Youcai Wu*, John Crawford, Hyung-Jin Choi	Jesse Sherburn*, William Heard, Omar Flores, Catherine Stephens, Michael Hammons	Pai-Chen Guan*, Onlei Annie Kwok, Chien-Ting Sun, Jia-Hong Jiang, Wen-Huai Tsou	Thanakorn Siriaksom*, Sheng-Wei Chi	

ROOM	10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM	11:40 AM
TS7 MS207 MS207 MS207 Finite Element Methods and High-Performance Computing for Environmental Fluid Mechanics, Chair(s): Ethan Kubatko						
Solana Beach B	**Modeling, Simulation and Visualization of Tsunami		Multiple Time Scales and Pressure Forcing in Discontinuous Galerkin Approximations to Layered Ocean Models	Development and Validation of a Mesh Movement Framework for Finite Element Simulation of Flow Beneath Ice Shelves	Optimal High-Order, Strong-Stability-Preserving Linear Multi-Step Time Discretizations for Discontinuous Galerkin Methods	Stereographic Coordinates for Efficient High-Order Discontinuous Galerkin Finite Element Method
	Kazuo Kashiwama*		Robert Higdon*	Benjamin Yeager*, Matthew Piggott, Paul Holland,	Rachel Sebian*, Ethan Kubatko, Ben Yeager	Vincent Legat*
TS7 MS108 Contemporary Models of Soft Biosolids: Biological Tissues, Scaffolds, and Cells, Chair(s): Michael Sacks						
Torrey Hill A	An Energy-Based Approach for Finite Element Modeling of Collagen-Swelling Interaction	Simulation of Fatigue in Bioprosthetic Heart Valve Biomaterials	Numerical Simulation of Fibrous Biomaterial with Randomly Distributed Fiber Network	A Multi-Scale Mechanobiological Model Considering the Structure and Interrelation of ECM Constituents in Aorta	The Role of Connective Tissue in Skeletal Muscle Force Generation: A Multi-Scale Investigation	
	Peter Pinsky*, Xi Cheng, Steven Petsche	Michael Sacks*	Tao Jin*, Ilinca Stanciulescu	Katherine Zhang*	Yantao Zhang*, J.S. Chen	
TS7 MS904 Scalable Methods for Uncertainty Quantification						
Torrey Hills B	Local Polynomial Chaos Method for Large-Scale Stochastic Problems	Combined Deterministic and Stochastic Adaptation for Goal-Oriented Uncertainty Quantification	Quasi-Optimal Approximations of Parameterized PDEs with Deterministic and Stochastic Coefficients	An Efficient Approach for Stochastic Optimization of Electricity Grid Operations		
	Dongbin Xiu*, Xueyu Zhu, Yi Chen	Isaac Asher*, Krzysztof Fidkowski	Guannan Zhang*, Clayton Webster, Hoang Tran, Ron DeVore	Cosmin Safta*, Richard Chen, Habib Najm, Ali Pinar, Jean-Paul Watson		

Wednesday, July 29, Technical Session 8

ROOM	02:00 PM	02:20 PM	02:40 PM	03:00 PM	03:20 PM	03:40 PM
TS8 MS1001 Microstructure-Governed Material Deformation: Theoretical and Computational Methods, Models and Outcomes, Chair(s): Fadi Abdeljawad						
Harbor G	Formability of Aluminum Alloys at Elevated Temperatures Using a New Thermo-Elasto-Viscoplastic Crystal Plasticity	Three-Dimensional Characterization and Modeling of Microstructure Effects on Nucleation and Growth of Spall Damage in FCC Materials	A Constitutive Model for Martensitic Phase Transformation Plasticity in Advanced High Strength Steels	Combined Isotropic-Kinematic Hardening Law Based on Two-Yield Surface for Asymmetric/Anisotropic Yielding and Hardening	Crystal Level Phase Transformation with a Dislocation Based Strength Model	
	Raja K. Mishra*, Ed Cyr, Mohsen Mohammadi, Kaani Inal	Pedro Peralta*, Kapil Krishnan, Sudrishti Gautam, Andrew Brown, Saul Opie, Leda Wayne	Farhang Pourboghrat*, Taejoon Park, Kwansoo Chung	Taejoon Park*, Farhang Pourboghrat, Kwansoo Chung	Saul Opie*, K. Krishnan, S. Gautam, A. Brown, E. Loomis, P. Peralta	
TS8 MS309 Atomistic Computation of Continuum Quantities, Chair(s): Pradeep Sharma						
Harbor H	An Assessment of Efficiency of Computation of Material Properties	Multi-Scale Analyses of Wave Propagation in Heterogeneous Media	Referential Continuum Fields in Atomistics			
	Tahir Cagin*	Chenchen Liu*, Celia Reina	Nikhil Chandra Admal*, Ellad Tadmor			
TS8 MS001 Minisymposium in Memory of Ted Belytschko: Advances in Meshfree, Particle, XFEM, GFEM, and Related Methods, Chair(s): Zhen Chen						
Harbor I	**Faults Simulations for Three-Dimensional Reservoir-Geomechanical Models with the Extended Finite Element Method		A Kriging-Based Finite Element Method for Shell Analysis	Enhanced Element Deletion Method and Applications in the Modeling of Fracking	Accelerated Simulation of Structural/Material Dynamics Based on Space-Time Finite Element Method	
	Jean Prevost*, N. Sukumar		Wichain Sommanawat*, Worsak Kanok-Nukulchai	Zhanli Liu*, Tao Wang, Haiyan Li, Zhuo Zhuang	Rui Zhang*, Lihua Wen, Dong Qian, , ,	
TS8 MS101 Topics in Computational Biomechanics, Chair(s): Grytz, Pierce						
Bankers Hill	An Active Contraction Model of Valvular Interstitial Cells	Pick Your Pole: Modeling the Subcellular Processes of Polarity Selection Cycles in Myxobacteria	A Gauge Fixing Procedure for Spherical Lipid Vesicles	Computational Equilibria of Two-Phase Lipid Bilayer Vesicles via Global Symmetry-Breaking Bifurcation	Custom Finite-Element Simulations Using GPGPU Technology: Towards Faster Patient-Specific Predictions	
	Yusuke Sakamoto*, Michael Sacks	Shant Mahserejian*, Francesco Pancaldi, Jianxu Chen, Chinedu Madukoma, Danny Chen, Joshua Shrout, Mark Alber	Sanjay Dharmavaram*	Siming Zhao*, Timothy Healey	David M. Pierce*, Vukasin Strbac, Nele Famaey, Jos Vander Sloten	

ROOM	02:00 PM	02:20 PM	02:40 PM	03:00 PM	03:20 PM	03:40 PM
TS8 MS709 Advances in Numerical Methods for Linear and Non-linear Dynamics, Chair(s): Ignacio Romero						
Cortez Hill A	**A Robust Composite Time Integration Scheme for Snap-Through Problems	Thermodynamically Consistent Integrators for Non-Smooth Coupled Problems	A High Performance Computing Approach to the Simulation of the Coupled Fluid-Multibody Dynamics Problems			
	Ilinca Stanciulescu*, Yenny Chandra, Yang Zhou	Ignacio Romero*, Elena Pastuschuk, Juan Carlos Garca Orden	Arman Pazouki*, Dan Negru			
TS8 MS703 Advanced Finite Elements for Complex-Geometry Computations: Tetrahedral Algorithms and Related Methods, Chair(s): Antonio J. Gil						
Cortez Hill B	Transient Nearly/Fully Incompressible Elasticity with Simple Tetrahedral Finite Elements: A VariationalMulti-ScaleApproach	A Variational Multi-Scale Approach for Transient Dynamics of Viscoelastic Materials Using Linear Tetrahedral Finite Elements	A Simple Linear Tetrahedral Finite Element Method for Non-Linear Implicit Elastodynamics	Total Lagrangian Hydrocode for Linear Tetrahedral Elements in Compressible, Nearly Incompressible and Truly Incompressible Fast Solid Dynamics	A First-Order Conservation Law Formulation for Lagrangian Fast Solid Dynamics in OpenFOAM	A Face-Based/Node-Based Selective Smoothed Finite Element Method (FS/NS-FEM) for Cardiovascular Tissues Using Linear Tetrahedral Elements
	Guglielmo Scovazzi*, Xianyi Zeng, Brian Carnes, Simone Rossi	Xianyi Zeng*, Guglielmo Scovazzi	Simone Rossi*, Nabil Abboud, Guglielmo Scovazzi	Chun Hean Lee*, Antonio Javier Gil, Javier Bonet, Rogelio Ortigosa	Jibran Haider*, Antonio Javier Gil, Chun Hean Lee, Javier Bonet	G.R. Liu*, Chen Jiang,
TS8 MS601 Enabling Software and Hardware Technologies Towards Exascale, Chair(s): Alvaro Coutinho						
Cove	Optimizing an Elastic Wave Propagation by Means of a Roofline-Based Strategy on Xeon Processors	High Performance Computing for RTM Uncertainty Quantification	HPC System Design Using Analytics			
	Albert Farres*, Mauricio Hanzich, Felix Rubio	Alvaro Coutinho*, Danilo Costa	Wiliam Barth*, James Browne, Robert DeLeon, Todd Evans, Thomas Furlani, Steven Gallo, Amin Ghaderohi, Matthew Jones, Robert McLay, Abani Patra			

ROOM	02:00 PM	02:20 PM	02:40 PM	03:00 PM	03:20 PM	03:40 PM
TS8 MS1006 Non-Classical Continuum Models for Materials With Microstructure, Chair(s): Sergey Kuznetsov						
Golden Hill A	Finite Element Method: A Strain-Integral-Based, Non-Local Formulation	Analysis of Material Defects in Micropolar Elastic Solids Using the Boundary Element Method	Non-Linear Localized Deformation Waves in the Continuum with Internal Oscillatory Degrees of Freedom			
	Paolo Fuschi*, Aurora Angela Pisano, Dario De Domenico	Elena Atroshchenko*, Jack S. Hale, Stphane P. A. Bordas	Sergey Kuznetsov*, Vladimir Erofeev			
TS8 MS109 Parallel Processing Techniques and Applications in Medicine, Chair(s): Sinan Kockara						
Golden Hill B	WebCL-Based Online Skin Lesion Border Detection for Dermoscopy	GPU-Based Parallel Algorithms for Simulation of Electro-Surgery Procedures in Real-Time	Parallel Collision Detection with WebCL for Web-Based Surgery Simulation	Virtual Intraoperative Cholangiogram Using WebCL		
	Sinan Kockara*, James Lemon, Tansel Halic	Zhongqing Han*, Venkata S. Arikatla, Suvrana De	Doga Demirel*, Alexander Yu, Sinan Kockara, Tansel Halic	Alexander Yu*, Doga Demirel, Tansel Halic, Sinan Kockara		
TS8 MS303 Recent Progress in Multi-scale Modeling at the Intersection of Ab-initio Methods, Mechanics and Mathematics, Chair(s): Vikram Gavini						
Harbor ABC	**Spatial and Temporal Coarse Graining in Dislocation Dynamics: Capturing the Elusive Cell Structure in Deformed Metals		Elastic Anisotropy and Low Symmetry Crystals in Dislocation Dynamics	Singularity-Free Dislocation Dynamics in Anisotropic Gradient Elasticity	Dislocation Dynamics Modeling of Slip-System Interactions in FCC Metals	
	Anter El-Azab*		Sylvie Aubry*	Giacomo Po*	Haruka Kawate*, Akiyuki Takahashi	
TS8 MS707 Isogeometric Methods for Complex and Multi-physics Systems, Chair(s): TBA						
Harbor DEF	**Boiling Flows: Thermomechanical Theory, Entropy-Stable Algorithm, and Simulations		Isogeometric Analysis of High-Cycle Fatigue and Damage Prediction Full Scale-Large Wind Turbines Including 3D Fluid-Structure Interaction	Isogeometric FluidStructure Interaction Analysis of Hydraulic Energy Absorbers	Isogeometric Structure-Preserving Methods for Magnetohydrodynamics and Fluid-Structure Interaction	Blended Isogeometric-Discontinuous Galerkin Methods for Multiphysics Applications and Shape Optimization
	Ju Liu*, Chad Landis, Hector Gomez, Thomas Hughes,		Xiaowei Deng*, Artem Korobenko, Jinhui Yan, Yuri Bazilevs	Chenglong Wang*, Ming-Chen Hsu, Yuri Bazilevs	John Evans*, Craig Michoski	Craig Michoski*, John Evans, Jesse Chan, Luke Engvall

ROOM	02:00 PM	02:20 PM	02:40 PM	03:00 PM	03:20 PM	03:40 PM
TS8 MS807 Stabilized and Multiscale Methods for Interface Mechanics, Chair(s): Isaac Harari						
Hillcrest A	**Finite Element Approximation of the Two-Phase Viscous-Viscoelastic Flow Problem		Adaptive Immersed Nurbs Method for Fluid-Structure Interaction	A Heterogeneous Modeling Method with Embedded Interfaces for Porous Media Flows		
	Ramon Codina*, Ernesto Castillo, Joan Baiges		Elie Hachem*, Youssef Mesri	Arif Masud*, Georgette Hlepas, Timothy Truster		
TS8 MS902 Model Error Assessment in Computational Physical Models, Chair(s): Khachik Sargsyan						
Hillcrest B	Sensitivity Analysis and Model Uncertainty Quantification for RANS Models of Separated Flows	Stochastic Inadequacy Operators: A Case Study in Methane Combustion	A Random Matrix Based Stochastic Upscaling for Nonlinear Finite Deformation Behavior	Uncertainty Quantification in the Numerical Simulation of Particle-Laden Flows: The Impact of Using Phenomenologic al Viscosity	Sensitivity Analysis and Post Shot Tuning	Multi-Model Ensemble Assimilation for Reducing Model Errors in Forecasts
	Todd Oliver*, Vikram Garg, Robert Moser	Rebecca Morrison*	Sonjoy Das*, Sourish Chakravarty	Gabriel Guerra*, Henrique F. da Costa, Fernando Rochinha, Felipe Horta, Marta Mattoso, Renato N. Elias, Alvaro L. G. A. Coutinho	James Glimm*, Baolian Cheng, David Sharp, Jeremy Melvin, Hyunkyoung Lim, Verinder Rana	Humberto C. Godinez*, Sean Elvidge
TS8 MS310 Multiscale Simulation for Failure and Uncertainty Quantification in Engineering Applications, Chair(s): Jacob Hochhalter						
Hillcrest C	Material Models and Responses at Micro- and Macro-Scales	Direct Numerical Simulations in Solid Mechanics for Quantifying the Effects of Microstructure and Material-Model Form Error on Macroscale Quantities of Interest	The Effect of Microstructural Heterogeneity on Ductile Fracture	Efficient, Multi-Scale Structural Reliability Predictions for Engineering Applications		
	Richard Field Jr.*, Mircea Grigoriu, John Emery	Joseph Bishop*, John Emery, Corbett Battaille	Geoffrey Bomarito*, James Warner	John Emery*, Richard Field, Joseph Bishop, Jay Carroll		

ROOM	02:00 PM	02:20 PM	02:40 PM	03:00 PM	03:20 PM	03:40 PM
TS8 MS716 Recent Advances in High Order Finite Element Methods, Chair(s): Lucia Gastaldi						
Hillcrest D	**Non-Symmetric Coupling of Boundary Elements and Ultraweak Finite Elements and DPG Method with Optimal Test Functions		High-Order Shape Functions for Exact Sequence Elements of All Shapes: Part I Methodology	High-Order Shape Functions for Exact Sequence Elements of All Shapes: Part II Pyramids	Hybrid Mixed Finite Element Method on Quadrilateral Meshes	
	Michael Karkulik*, Norbert Heuer		Brendan Keith*, Federico Fuentes, Leszek Demkowicz	Federico Fuentes*, Leszek Demkowicz, Brendan Keith	Thiago Quinelato*, Abimael Loula, Maicon Correa	
TS8 MS505 Advances in Topological Optimization with Application to Advanced Manufacturing, Chair(s): Brett Clark						
Mission Beach A	Topology Design in Inverse Homogenization for Thermelastic Properties	Frequency Optimization of an Accelerometer Bracket	Topology Optimization of Structures with Viscoelastic Creep Constraints	Proportional Topology Optimization: A New Non-Sensitivity Method for Solving Stress Constrained and Minimum Compliance Problems and Its Implementation in MATLAB		
	Seth Watts*, Daniel Tortorelli, Christopher Spadaccini	Devlin Hayduke*	Kai James*, Haim Waisman	Emre Biyikli*, Lin Cheng, Albert To		
TS8: MS408 Computational Modeling of Extreme Loading Environments, Chair(s): David Littlefield						
Mission Beach B	Investigation of Yield Surface Characterization for Dynamic Strain Localization	The Insertion of a Submesh with the Extended Finite-Element Method	Research on the Key Technologies of Vibroseis Vehicle Roll-Over Protection Structure Based on Computational Dynamics Simulation, and Its Robust and Proactive Anti-Rollover Control			
	Richard Becker*	Mark Merewether*, John Dolbow, Tim Shelton, Mike Veilleux	Zhen Chen*, Zhiqiang Huang, Shuang Jing, Qin Li			

ROOM	02:00 PM	02:20 PM	02:40 PM	03:00 PM	03:20 PM	03:40 PM
TS8 MS503 Model and Solution Reduction Methods for Direct and Inverse Problems in Computational Mechanics, Chair(s): Pablo Blanco						
Mission Beach C	**Model Order Reduction for Coupled Problems		Improving the Computational Efficiency of Multi-Scale Modelling by Applying Model Reduction Techniques	Reduced-Order Modeling of Turbulent Flows with Applications in Nuclear Reactor Components		
	Wil Schilders*		Malgorzata J. Zimon*, Prof. David R. Emerson, Dr. Leopold Grinberg, Dr. Robert Prosser, Prof. Jason M. Reese	Mohammad Ahmadpoor*, Greg Banyay, John Brigham		
TS8 MS909 Validation and Uncertainty Quantification in Real World Applications: Challenges & Opportunities, Chair(s): Kumar Vemaganti						
Ocean Beach	Open-Source Software for Automation of Verification, Validation, and Uncertainty Quantification of Codes in Computational Mechanics	The Influence of Dynamic Rollover Test System (DRoTS) Constraints on Vehicle Response	Uncertainty Quantification of Statistical Properties of Surface Micro-Topography Using Bayesian Calibration	Solution of a Robust Optimization Problem to Maximize the Rate of Penetration of Horizontal Drillstrings Using a Non-Linear Stochastic Dynamic Model		
	Kaveh Zamani*, James Courtney, Fabian Bombardelli	Bronislaw Gepner*, Matthew Panzer, Qi Zhang, Jason Kerrigan	Bhargava Sista*, Sandeep Madireddy, Kumar Vemaganti	Americo Cunha Jr*, Christian Soize, Rubens Sampaio		
TS8 MS210 Modeling Flow and Transport in Heterogeneous Porous Media, Chair(s): Kalyana Nakshatrala						
Pier	Application of a Constrained Mass-Generalized Multiscale Finite Element Method to Flow Models	A Comparative Study on the Parallel Performance of Locally Conservative Mixed Finite-Element Formulations for Darcy Problems	On Lattice Boltzmann Methods for Flow and Transport Problems in Porous Media	dfnWorks: A Discrete Fracture Network Framework for Modeling Flow and Transport in Fractured Porous Medium		
	Michael Presho*	Justin Chang*, Kalyana Nakshatrala, Lennart Johnsson	Saeid Karimi*, Kalyana Babu Nakshatrala	Satish Karra*, Jeffrey Hyman, Natalia Makedonska, Hari Viswanathan, Carl Gable, Scott Painter		

ROOM	02:00 PM	02:20 PM	02:40 PM	03:00 PM	03:20 PM	03:40 PM
TS8 MS307 Multiscale Modeling and Simulation of Fracture and damage in quasi-brittle solids						
Promenade A	Modeling of Lamellar Fracture of Polysynthetically Twinned (PST)-TiAl Crystals Using Cohesive Zone Models and XFEM in a Two-Scale FE Approach	An Efficient Binning Scheme with Application to Dynamic Brittle Failure				
	Mohammad Rizviul Kabir*, Marion Bartsch	Farah Huq*, Rebecca Brannon, Lori Graham-Brady				
TS8 MS711 Polygonal and Polyhedral Discretizations in Computational Mechanics, Chair(s): Gillette						
Promenade B	Space-Time Finite-Element Exterior Calculus and Variational Discretizations of Gauge Field Theories	Hilbert Complexes and Finite Element Spaces for Second-Order Tensors	Virtual Elements and Mimetic Methods	Connecting Mimetic Finite Differences and Finite Volume Methods for Voronoi Diagrams	Hexahedral Elements for the H(curl) and H(Div) Spaces: Using Techniques from Mimetic Finite Differences to Improve Computational Efficiency and Accuracy	
	Joe Salamon*, Melvin Leok, John Moody	Arzhang Angoshtari*, Arash Yavari	Gianmarco Manzini*	Omar Al-Hinai*, Mary F. Wheeler, Ivan Yotov,	Jerome Solberg*	
TS8 MS409 Computational and Experimental Investigation of Manmade and Natural Disasters, Chair(s): Jason Roth						
Solana Beach A	Advancements to Blast Loading in the Analysis of Structural Systems	Acceptance Criteria for Structural Response to Impact and Blast Loading	Development and Experimental Validation of a Dual-Core Self-Centering Sandwiched Buckling-Restrained Brace (SC-SRRB) Using High-Strength Steel Tendons as Tensioning Elements			
	Lauren Stewart*, J. Diaz-Ospina	John Puryear*, William Leboeuf, Matthew Kraemer	Chung-Che Chou*, Wen-Jing Tsai, Ping-Ting Chung			

ROOM	02:00 PM	02:20 PM	02:40 PM	03:00 PM	03:20 PM	03:40 PM
TS8 Finite Element Methods and High-Performance Computing for Environmental Fluid Mechanics, Chair(s): Kazuo Kashiyama						
Solana Beach B	Algorithms and High-Performance Computing for Hurricane Mitigation Analysis	A Storm Surge Model for the Coastlines of Japan with a Detailed Representation of the Low-Lying Area in Tokyo	A Multi-Dimensional Discontinuous Galerkin Modeling Framework for Overland Flow	Finite-Cover-Based FSI Analysis with Tsunami Impact Loading	A Coupled Rainfall-Runoff/River Flow Model for the Ohio River	Performance Improvements for High-Order Discontinuous Galerkin Solutions to the Shallow Water Equations
	Clint Dawson*, Jennifer Proft, Ali Samii, Wei Du, Gajanan Choudhary,	Shintaro Bunya*, Satoshi Iizuka, Kohin Hirano, Takahiro Oyama, Masahiro Futami,	Dustin West*, Ethan Kubatko	Shinsuke Takase*, Shuji Moriguchi, Kenjiro Terada, Mayu Muramatsu	Mariah Yaufman*, Cody Allison, Taylor Ross, Ethan Kubatko	Steven Brus*
TS8 MS104 Modeling of Vascular Tissue						
Torrey Hills A	Effect of Elevated Intracranial Pressures on Cerebral Aneurysm: A Fluid-Structure Interaction Study	Regularizing the Inverse Problem to Solve the Elastic Property Distribution of Vascular Tissues	Going Beyond the Diameter in Predicting Rupture of Aneurysms: Investigating the Influence of Iliac Artery Occlusion on Hemodynamics and Wall Stresses of Abdominal Aortic Aneurysms	A Composite Structure Model for Arterial Walls and its Interaction with Blood Flow	Wall Stress Computations in Abdominal Aortic Aneurysms: A Clinically Feasible Approach	
	Hasson Syed*, Vinu Unnikrishnan, Semih Olcmen	Yue Mei*, Sevan Goenezen	Sandra Rugonyi*, Venkat Keshav Chivukula, Stephen Haller, Jeff Crawford, Sevan Goenezen	Martina Bukac*	Sevan Goenezen*, Jaime Zelaya, Amir Azarbal, Sandra Rugonyi	
TS8 MS904 Scalable Methods for Uncertainty Quantification						
Torrey Hills B	A Multi-Tiered Approach to UQ in High-Dimensional Uncertainty Spaces	Uncertainty Quantification for Groundwater Contamination Using Measure Theory	The Signal-to-Noise Ratio Due to Biological Noise in Field-Effect Sensors Calculated Using the Stochastic Poisson Equation and Polynomial-Chaos Expansion	Quantifying the Influence of Conformational Uncertainty in Biomolecular Solvation	Subspace Methods for Multi-Physics Large-Scale Uncertainty Quantification	
	Richard Klein*, Don Lucas, Vera Bulaevskaya, Gardar Johannesson, Peer-Timo Bremer, David Domyancic, Scott Brandon	Steven Mattis*, Clint Dawson, Troy Butler	Amirreza Khodadadian*, Clemens Heitzinger	Huan Lei*, Xiu Yang, Bin Zheng, Guang Lin, Nathan Baker	Bassam Khuwaileh*, Paul Turinsky	

Wednesday, July 29, Technical Session 9

ROOM	04:30 PM	04:50 PM	05:10 PM	05:30 PM	05:50 PM	06:10 PM
TS9 MS1001 Microstructure-Governed Material Deformation: Theoretical and Computational Methods, Models and Outcomes, Chair(s): Ajit Achuthan						
Harbor G	Predicting Shape Effect on Effective Thermo-Mechanical Properties for Heterogeneous Particulate Composites Using Higher-Order Statistical Micromechanics	Correlating the Free-Volume Evolution to Plastic Deformation of Highly Cross-Linked Polymers from Large Scale Coarse-Grained MD Simulations	Structural Arrangements During Plastic Deformations of Amorphous Polymers			
	Andrew Gillman*, Karel Matou	Amin Aramoon*	Alejandro Pacheco*, Romesh Batra			
TS9 MS309 Atomistic Computation of Continuum Quantities, Chair(s): Nikhil Chandra Admal						
Harbor H	Reformulation of Nos-Hoover Thermostat for Heat Conduction Simulation at Nanoscale	Thermal Boundary Resistance from Atomic Simulations: Parameterization of a Microstructure Informed Continuum Model	Thermomechanical Properties and Equation of State of \Gamma-RDX			
	Jiaoyan Li*, James Lee	Nipun Goel*, Edmund Webb, Alparslan Oztekin, Sudhakar Neti	Kartik Josyula*, Rahul, Suvarna De			
TS9 MS707 Isogeometric Methods for Complex and Multi-physics Systems, Chair(s): John Evans						
Harbor I	Analysis Suitable Geometry	TriGA: Generalization of Isogeometric Analysis to Unstructured Triangular and Tetrahedral Discretizations	Isogeometric Reduced-Order Modeling with Application to Optimization of Shells	Applications and Extensions of Bzier Projection Including Isogeometric Petrov-Galerkin Methods	Direct Evaluation of Unified Extended Splines	
	Kevin Tew*, Emily Evans, Guillermo Lorenzo Gomez, Michael Scott, Derek Thomas	Luke Engvall*, John Evans	Joseph Benzaken*, Christopher Coley, John Evans	Derek C. Thomas*, Thomas J. R. Hughes, Michael A. Scott,	Emily Evans*, Ian Henriksen	

ROOM	04:30 PM	04:50 PM	05:10 PM	05:30 PM	05:50 PM	06:10 PM
TS9 MS101 Topics in Computational Biomechanics, Chair(s): Pierce, Grytz						
Bankers Hill	A Computational Model of Tendon Remodeling	Initiation and Progression of Saccular Aneurysm Enlargement from Medical Image Data	Multi-Scale Computational Modeling of Keratoconus Progression			
	David Smith*	Fred Nugen*, Luca Dede', Michael Borden, Thomas JR Hughes	Rafael Grytz*, Sally Hayes, Craig Boote, Keith Meek			
TS9 MS709 Advances in Numerical Methods for Linear and Non-linear Dynamics, Chair(s): Alexander Ildesman						
Cortez Hill A	An Alternate Approach Towards Synthesis and Analysis of Nonlinear Suspension Kinematics and Dynamics	An Integrated Seismic-Motion Forward Solver for the Study of Topographic Amplification Effects in Large Sedimentary Basins	A Waveform Relaxation Newmark (WRN) Method for Structural Dynamics	Modelling wave propagation in large structures using the Scaled Boundary Finite Element Method	A Finite Element-Based PML Method for Time-Domain Electromagnetic Wave Propagation Analysis	
	Gregory Hulbert*, David Kline	Babak Poursartip*, Loukas F. Kallivokas	Marco Pasetto*, Haim Waisman, Jiun-Shyan Chen	Hauke Gravenkamp*	Jun Won Kang*, Sangri Yi, Namho Joh, Boyoung Kim	
TS9 MS703 Advanced Finite Elements for Complex-Geometry Computations: Tetrahedral Algorithms and Related Methods, Chair(s): G. Scovazzi						
Cortez Hill B	A Coupled ALE-AMR Approach to Shock Hydrodynamics on Tetrahedral Grids	Application of Preconditioned Iterative Methods in Selective Smoothed Finite Element Methods with Tetrahedral Elements for Nearly Incompressible Materials	Locking-Free Pyramid Finite Elements for Transitional Mesh			
	Jacob Waltz*, Jozsef Bakosi	Yuki Onishi*	David Weinberg*, Ravi Burla, Jaesung Eom			

ROOM	04:30 PM	04:50 PM	05:10 PM	05:30 PM	05:50 PM	06:10 PM
TS9 MS1004 Predictive Modeling of the Co-Evolution of Microstructure and Properties: 2nd Minisymposium, Chair(s): David P. Field						
Cortez Hill C	Fully Coupled Phase-Field and Elasto-Viscoplastic Fast Fourier Transform Models for Advanced Mesoscale Thermal-Mechanical Processing Simulation	Computational Study of the Directed Self-Assembly of Porous Thin-Film Membranes with Colloidal Particle Coated Channels	Structure-Property Modeling for the Heat Affected Zone in Linepipe Steels	Atomistic Study of Helium-3 Bubble Growth in Aging Palladium Tritides	Characterization of the Evolution of Delta Hydrides in Zr and Zr-4	
	Stephen Niezgoda*, Pengyang Zhao, Yunzhi Wang, Thaddeus Low,	Paul Millett*, Joseph Carmack	Matthias Militzer*	Jonathan Zimmerman*, Lucas Hale, Bryan Wong	Mark Carroll*, DC Haggard, David Swank, Laura Carroll	
TS9 MS504 Optimization with CFD, Chair(s): Sanjay Mittal						
Cove	**Shape Optimization of a Corrugated Airfoil and Planform Optimization of a Finite Wing		Towards High Fidelity Design in the Age of Extreme-Scale Supercomputing	Optimisation of Complex Flows with Discrete Sensitivity Analysis	Least Squares Shadowing: A Sensitivity Analysis Method for Chaotic and Turbulent Fluid Flows	Design of Airfoils with Desired Pitching Moment Characteristics
	Sanjay Mittal*, Varun Bhatt, Sambhav Jain		Qiqi Wang*, Chaitanya Talnikar, Patrick Blonigan	Oliver Browne*, Gonzalo Rubio, Esteban Ferrer, Eusebio Valero	Patrick Blonigan*, Qiqi Wang	Jawahar Sivabharathy*, Sanjay Mittal
TS9 MS808 Innovative Methods for Fluid-Structure Interaction						
Golden Hill A	Review of Recent Developments and Challenges in CFD Modeling of Vortex-Induced Vibrations and Flapping Dynamics	A Reduced-Order Model for an Oscillating Hydrofoil with Large Angles of Attack and Near the Free Surface				
	Rajeev Jaiman*	Dillon Helfers*, Rory Kennedy, Yin Lu Young				

ROOM	04:30 PM	04:50 PM	05:10 PM	05:30 PM	05:50 PM	06:10 PM
TS9 MS303 Recent Progress in Multi-scale Modeling at the Intersection of Ab-initio Methods, Mechanics and Mathematics, Chair(s): Phanish Suryanarayana						
Golden Hill B	On the Geometry of Dissipative Evolution Equations	Equilibrium Maps of Nano-structures	A Consistent Energy-Based Atomistic-to-Continuum Coupling Method for Multilattices	A Three-Dimensional Field Formulation, and Isogeometric Solutions to Point and Line Defect Cores Using Toupin's Theory of Gradient Elasticity at Finite Strains	Dislocation Dynamics Simulation of Transition of Dislocation-Precipitate Interaction Mechanism	
	Celia Reina*, Johannes Zimmer	Subrahmanyam Pattamatta*, Ryan Elliott, Ellad Tadmor	Derek Olson*, Mitchell Luskin, Alexander Shapeev	Zhenlin Wang*, Shiva Rudraraju, Krishnakumar Garikipati	Masaki Miyagi*, Akiyuki Takahashi	
TS9 MS805 Advanced Discretization Methods for Interface Problems: Theory, Algorithms and Applications, Chair(s): Andre Massing						
Hillcrest A	Immersed Finite Element Methods with Edge Penalties for Interface Problems	Moving Interfaces in Finite Element Methods: A Fictitious Domain Approach	Nitsche-XFEM Fictitious Domain Methods and Splitting Schemes for the Simulation of Thin-Walled Structures Immersed in an Incompressible Fluid	Nitsche Cut Finite Element Methods with Higher Order Elements	A Cut Discontinuous Galerkin Method for the Laplace-Beltrami Operator with Applications to Surface-Bulk Problems	
	Tao Lin*	Sebastien Court*	Mikel Landajuela*, Frdric Alauzet, Benoit Fabrges, Miguel A. Fernndez	August Johansson*, Mats Larson, Anders Logg	Andre Massing*, Erik Burman, Peter Hansbo, Mats G. Larson	
TS9 MS1005 Multiphysical Modeling of Geomaterials, Chair(s): M.J. Sanchez/WaiChing Sun						
Hillcrest B	**Non-Linear Finite Element Analysis of Partially-Saturated Fractured Porous Media Using a Coupled Thermo-Poro-Mechanical Cohesive Interface Element		Framework for Double Porosity Flow in the Finite Deformation Range	Computational Geomechanics of CO ₂ Geological Storage Systems	A Stabilized Finite Element Formulation for Diffusion in Incompressible Media Undergoing Large Deformations	
	Wei Wang*, Richard Regueiro		Jinhyun Choo*, Ronaldo Borja	Pania Newell*, Mario J. Martinez	Andreas Krischok*, Christian Linder	

ROOM	04:30 PM	04:50 PM	05:10 PM	05:30 PM	05:50 PM	06:10 PM
TS9 MS306 Computational,Multiscale and Experimental Mechanics of Fibers and Fibrous Materials, Chair(s): Artem Kulachenko						
Hillcrest C	**Numerical Simulation of the Mechanical Behavior of Fibrous Materials at Microscopic Scale	Compression-Loose Fiber Media: Continuum Constitutive Law and Single Crack Case-Study	A Finite Element Model for Arbitrarily Oriented Fibers and their Contact Interaction Based on Geometrically Exact Kirchhoff Beam Elements	Continous Fiber Thermoplastic Modeling and Simulation at Processing Temperatures		
	Damien Durville*	Omar Mahmood*, Basile Audoly, David Rodney, Stephane Roux	Christoph Meier*, Alexander Popp, Wolfgang A. Wall	Nahiene Hamila*, Eduardo Guzman-Maldonado, Philippe Boisse		
TS9 MS716 Recent Advances in High Order Finite Element Methods, Chair(s): Robert Haber						
Hillcrest D	Adaptive FEM in the Approximation of Clusters of Eigenvalues of the Laplace Problem in Mixed Form	Discontinuous Petrov Galerkin (DPG) Method with Optimal Test Functions: A New Perspective	Space-Time Discontinuous Petrov-Galerkin Finite Elements for Fluid Flow	Construction of DPG Fortin Operator	Benchmark Computations with High-Order, Shell-Finite Elements	
	Lucia Gastaldi*	Leszek Demkowicz*	Truman Ellis*, Leszek Demkowicz, Jesse Chan, Nathan Roberts	Sriram Nagaraj*, Socratis Petrides	Antti H. Niemi*	
TS9 Computational Methods in Image Analysis, Chair(s): Joao Tavares						
Mission Beach A	Novel Image Processing Pipeline for Dermoscopic Images	Study of the Biomechanical Behavior of the Female Bladder Neck				
	Joao Tavares*, Zhen Ma	Renato Natal Jorge*, Marco Parente, Sofia Brando, Dulce Oliveira, Elisabete Silva, Teresa Mascarenhas				

ROOM	04:30 PM	04:50 PM	05:10 PM	05:30 PM	05:50 PM	06:10 PM
TS9 MS801 Fluid Structure Interaction Algorithms and Applications, Chair(s): Scott Miller						
Mission Beach B	FSI-Modeling of Wind Turbine Blades Including LaminarTurbulent Transition	A Non-Linear Simplified FSI-Model: Application to Autoregulated Flows	A Hybridizable Discontinuous Galerkin Formulation for Fluid-Structure Interaction	An ALE-FEM for a Poroelastic Mixture Model for Fluid Flow in the Brain		
	Dorothee Pieper*, Thomas Graetsch, Michael Breuer	Matteo Aletti*, Jean-Frdric Gerbeau, Damiano Lombardi	Jason Sheldon*	Scott Miller*, Francesco Costanzo		
TS9 MS503 Model and Solution Reduction Methods for Direct and Inverse Problems in Computational Mechanics, Chair(s): Max Gunzburger						
Mission Beach C	Verification of Reduced-Order Modelling Codes with Truncated Bases	An Adaptive Parametrized-Background Data-Weak Approach to State Estimation	Proper and Smooth Orthogonal Decomposition-Based Model Order Reduction for Complex Systems	HiPOD: Two POD Strategies for a Hierarchical Model Reduction	Pipe-Oriented Finite Elements for the Three-Dimensional Blood Flow Simulation	
	Nicholas LaBarbera*, Jonathan Pitt	Tommaso Taddei*, James Penn, Masayuki Yano, Anthony Patera	Shahab Ilbeigi*, David Chelidze,	Simona Perotto*, Massimiliano Lupo Pasini, Alessandro Veneziani	Pablo Blanco*, Alonso Alvarez, Ral Feijo	
TS9 MS305 Multiscale Modeling and Characterization of Multiphysics for Nano, Bio and Smart Materials, Chair(s): Dr. Jiaoyan Li						
Promenade A	**Optimal Design of Polymeric Laminates for Maximum Energy Dissipation Under Low-Velocity Impact		Multiscale Modelling of Multi-Physics: From Atom to Continuum	Hadamard Instability Analysis for Coupled Chemo-Thermo-Mechanical Systems	On Rightward Axial Rotation in Early Chick Embryonic Development	Design and Experimental Evaluation of a 3D-Printed Interconnected Microvascular Mimicking Network For Highly Efficient Bone Growth
	Romesh Batra*, Guillaume Antoine		James Lee*, Jiaoyan Li, Zhen Zhang	Xanthippi Markenscoff*	Zi Chen*	Benjamin Holmes*, Kartik Bulusu, Michael Plesniak, Lijie Zhang

ROOM	04:30 PM	04:50 PM	05:10 PM	05:30 PM	05:50 PM	06:10 PM
TS9 MS711 Polygonal and Polyhedral Discretizations in Computational Mechanics, Chair(s): Bishop						
Promenade B	Bijective Finite-Element Method	Numerical Integration of Polynomials on Convex and Non-Convex Polygons and Polyhedra	Smoothed Finite Elements of Polyhedral Shape	A Semi-Analytical Displacement Based Formulation of Arbitrary Polyhedral Elements	Polygonal Elements for Finite Elasticity	
	Teseo Schneider*, Patrick Zulian, Rolf Krause, Kai Hormann	Eric Chin*, Jean Lasserre, N. Sukumar	Hobeom Kim*, Chan Lee, Seyoung Im	Chongmin Song*, Sundararajan Natarajan, Hossein Talbe, Albert Saputra, Ean Tat Ooi	Heng Chi*, Cameron Talischi, Oscar Lopez-Pamies, Glaucio Paulino	
TS9 MS715 Advances in Implicit / Explicit (IMEX) Time integration of Multiphysics Systems, Chair(s): John N. Shadid						
Solana Beach A	Solution of Eulerian Frame MHD Simulations with Multi-Stage RK Implicit/Explicit (IMEX) Time Integration	Advances in Particle-in-Cell Time Integration Techniques of Vlasov-Maxwell Equations for Collisionless Kinetic Plasma Simulations	IMEX Lagrangian and ALE Methods for Multiphysics Systems	State-of-the-Art and Overview of Advances in "Integrators" and Framework of Implicit/Explicit Algorithms/Designs for Multiphysics Applications	A Posteriori Analysis of Implicit-Explicit (IMEX) Methods	Characteristic-Based Flux Splitting for Implicit-Explicit Time Integration of Low-Mach Number Flows
	John Shadid*, Eric Cyr, Roger Pawlowski	Guangye Chen*, Luis Chacon	Eric C. Cyr*	Kumar Tamma*, Masao Shimada	Jehanzeb Chaudhry*, Donald Estep, Victor Ginting, John Shadid, Simon Tavener	Debojyoti Ghosh*, Emil Constantinescu
TS9 Finite Element Methods and High-Performance Computing for Environmental Fluid Mechanics, Chair(s): Clint Dawson						
Solana Beach B	Discontinuous Galerkin (DG) Modified Basis Methods for Baroclinic Flows	Formulation and Implementation of the 3D Shallow Water Adaptive Hydraulics (AdH) Software	Recent Advances in High-Order Discontinuous Galerkin Methods for Shallow Water Flow	Feeding the Beast: Pragmatic Environmental Data Retrieval for Today's Simulation Models	1D, 2D, and 3D Unstructured-Grid Modeling of Sediment Transport in a Salt-Marsh Estuary	
	Colton Conroy*, Ethan Kubatko	Corey Trahan*	Ethan Kubatko*	Dharhas Pothina*	Yun Zhang*, Oliver Fringer	

ROOM	04:30 PM	04:50 PM	05:10 PM	05:30 PM	05:50 PM	06:10 PM
TS9 MS110 Computational Mechanics and Biology of Human Tissues , Chair(s): Elisa Budyn						
Torrey Hills A	Investigation of Mechanical Parameters Role on the Morphogenesis of Cortical Folding	Wave Velocity Dispersion and Spurious Reflections of Timoshenko's Flexural Waves	Growth and Incompatibility: Experimental Characterization on Expanded Porcine Skin	Mechanobiology of Live Allograft Bone Systems (LABS)		
	Mir Jalil Razavi*, Tuo Zhang, Ryan Romeo, Tianming Liu, Xianqiao Wang	Jose Laier*	Adrian Buganza-Tepole*, Chad A. Purnell, Michael Gart, Arun K. Gosain, Ellen Kuhl	Elisa Budyn*, Morad Bensidhoum, Patrick Tauc, Eric Schmidt, Eric Deprez, Herve Petite		
TS9 M907 Randomness, Fractals, and Computational Mechanics, Chair(s): Paul Demmie						
Torrey Hills B	The Generation Of Random Correlated Tensor Fields	An Approach to Peridynamic Theory for Fractal Media	Hausdorff Dimension Estimation via Elastodynamic Excitation of Fractal Media	Simulation of Elastic Wave Propagation Using Cellular Automata and Peridynamics		
	Aaron Chesar*, Luis Costa,	Paul Demmie*, Martin Ostoja-Starzewski	Hadji Joumaa*	Vinesh Nishawala*, Martin Ostoja-Starzewski, Michael Leamy, Paul Demmie		

Thursday, July 30, Technical Session 10

ROOM	8:30 AM	8:50 AM	9:10 AM	9:30 AM	9:50 AM	10:10 AM
TS10 MS1012 Advances in Computational Methods for Heterogeneous Materials, Chair(s): Bo Li						
Harbor D	**A Multi-Scale Model for the Thermomechanical Response of Materials	Mechanical Investigation of Bouligand Micro-structures	Advances in Error Estimation for Homogenisation	Multi-Scale Modeling and Simulation of Powder Compaction		
	Julian J. Rimoli*, Jean-Baptiste Bouquet	David Restrepo*, Nobphadon Suksangpanya , Nicolas Guarin, Michael Jones, Nicholas Yaraghi, David Kisailus, Pablo Zavattieri	Daniel Alves Paladim*, Pierre Kerfriden, Jos Paulo Moitinho de Almeida, Mathilde Chevreuil, Stphane Bordas	Marcial Gonzalez*		
TS10 MS1001 Microstructure-Governed Material Deformation: Theoretical and Computational Methods, Models and Outcomes, Chair(s): Hojun Lim						
Harbor G	**Dislocation Dynamics Simulations of Void Strengthening Mechanisms	Microstructure Size Effect Incorporated Crystal Plasticity Constitutive Model for Multi-Phase Polycrystalline Materials	Crystal Plasticity Analysis of HCP Polycrystals			
	Joshua Crone*, Lynn Munday, Jaroslaw Knapp	Ajit Achuthan*, Masoud Ghorbani Moghaddam ,	Ji Hoon Kim*, Joo-Hee Kang, Chang Dong Yim, Myoung-Gyu Lee, Chang-Seok Oh			
TS10 MS903 Uncertainty Quantification for High-dimensional Stochastic Processes and their Applications, Chair(s): Kenny Chowdhary						
Harbor H	High-Dimensional Uncertainty Quantification and Learning Backward in Time	Probabilistic Inference of Model Parameters and Missing High-Dimensional Data Based on Summary Statistics	Flowgraph Models for the Bayesian analysis of Stochastic Processes	Variational Multi-Scale Analysis of Stochastic Partial Differential Equations	A Dynamically Bi-Orthogonal Method for Time-Dependent Stochastic Partial Differential Equation	Bayesian Karhunen - Loeve Expansions: A Random Subspace Approach
	Pierre Lermusiaux*	Mohammad Khalil*	Aparna Huzurbazar*	Jason Li*, Jayanth Jagalur-Mohan, Assad Oberai, Onkar Sahni	Zhiwen Zhang*, Mulin Cheng, Thomas Hou	Kenny Chowdhary*
ROOM	8:30 AM	8:50 AM	9:10 AM	9:30 AM	9:50 AM	10:10 AM

TS10 MS1009 Integration of Crystal Plasticity into Modeling and Simulations of Materials across Different Length and Time Scales, Chair(s): Minh-Son Pham, Anthony Rollett						
Harbor I	A Crystal Plasticity Temperature and Orientation Dependent Constitutive Model in Nickel-Based Superalloys	Spectral Full-Field Deformation Modeling of 2-Phase Titanium Structures on a Spectrum of Alpha Fractions and Beta Morphologies	Predicting the Temperature-Dependence of the Yield Stress in Tungsten using Atomistically-Informed Crystal Plasticity Simulations	Crystal Plasticity-Based Constitutive Modeling for Forming and Service Duties of Metallic Materials	A Finite Element Study of Deformation Behavior of Steel Specimens in order to obtain an Optimum Biaxial Tensile Test Specimen Design	
	Shahriyar Keshavarz*, Somnath Ghosh	Tugce Ozturk*, Ross Cunningham, Reeju Pokharel, Robert Suter, Anthony Rollett	David Cereceda*, Martin Diehl, Jaime Marian	Minh-Son Pham*, Anthony Rollett, Stuart Holdsworth, Adam Creuziger, Mark Iadicola, Youngung Jeong, Jonathan Guyer, Timothy Foecke	Dilip Banerjee*, Mark Iadicola, Adam Creuziger, Timothy Foecke	
TS10 MS1010 Stochastic Material Characterization for Fiber Reinforced Composites, Chair(s): P.K. Basu						
Bankers Hill	Stochastic Sequential Multi-Scale Modeling of Fiber Reinforced Composites	Identification of Key Microstructure Features in the Design of Nanocomposites	Statistically Augmented Boundary Conditions (SABC) for Defining Statistically Equivalent RVE or SERVEs in Two-Phase Composite Materials			
	Mason Hickman*, Prodyot Basu	He Zhao*, Ramin Bostanabad, Anqi Hu, Wei Chen, L. Catherine Brinson	Dhirendra Kubair*, Somnath Ghosh			

ROOM	8:30 AM	8:50 AM	9:10 AM	9:30 AM	9:50 AM	10:10 AM
TS10 MS709 Advances in Numerical Methods for Linear and Non-linear Dynamics, Chair(s): Alexander Idesman						
Cortez Hill A	New Closed-Form Analytical Solutions to Some Classical Problems in Elastodynamics	The Principle of Stationary Action and Fundamental Solutions of Two-Point Boundary Value Problems	Mixing in Particulate Flows: 2D Vesicle Suspensions	Survey of Numerical Methods for the Stability Analysis Eigenvalue Problem: The 2D Flat Plate Boundary Layer	Predictive Numerical Models for Non-Linear Dynamic Behavior of Elastomer Damping Devices	
	George Gazonas*	William McEneaney*, Peter Dower	Gokberk Kabacaoglu*, George Biros, Bryan Quaife	Silvia Sanvido*, Eusebio Valero Sanchez, Javier de Vicente Buendia	Jean-Francois Deu*, Benjamin Morin, Antoine Legay, Lucie Rouleau	
TS10 MS704 Advances in the Boundary Element Method, Chair(s): Yijun Liu, Martin Schanz						
Cortez Hill B	Isogeometric Boundary Element Methods	A Comparison of Inverse Transformations for Elastodynamic Boundary Element Method	Modeling Acoustic Metamaterials Using the Boundary Element Method	Numerical Verification of Local Eshelby Matrix in 2-D Eigen-Variable Boundary Integral Equations for Particles/Cracks in Full Space	Isoparametric Closure Elements in Boundary Element Method	
	Matthias Taus*, Gregory Rodin, Thomas Hughes	Martin Schanz*, Wenjing Ye, Jinyou Xiao	Yijun Liu*, Anli Wang, Bangjian He	Hang Ma*	Xiao-Wei Gao*	
TS10 MS1004 Predictive Modeling of the Co-Evolution of Microstructure, Chair(s): Pritam Chakraborty						
Cortez Hill C	**Ramifications of Post Processing on Geometrically Necessary Dislocation Calculations from EBSD-Based Orientation Measurements		Dislocation Density Observations and Crystal Plasticity Modeling for Deformation of Alpha Iron	Experimental and Simulation Analysis of Single Particle Impacts in Aluminum-Copper Alloys	Multi-Scale Modeling of Microstructure Dependent Fracture in UO2	
	Stuart I. Wright*, David P. Field, Matthew M. Nowell		David Field*, Zhe Leng, Nathalie Allain-Bonasso, Francis Wagner	Luke Brewer*, Joseph Hooper,	Pritam Chakraborty*, Yongfeng Zhang, Michael Tonks	

ROOM	8:30 AM	8:50 AM	9:10 AM	9:30 AM	9:50 AM	10:10 AM
TS10 MS504 Optimization with CFD, Chair(s): Sanjay Mittal						
Cove	Level-Set XFEM Topology Optimization of 3D Navier-Stokes and Scalar Transport Problems	Efficient and Robust Usage of CAD Parameterization Capability for Aerodynamic Shape Optimization	Investigation of Flow Corrective Devices for the Heat Recovery Steam Generation Inlet Duct	Evolutionary Design of Natural Laminar Airfoil Coupled to Shock Control Bumps for Drag Reduction Using Pareto, Nash and Stackelberg Games		
	Hernan Villanueva*	Kamil Bobrowski*, Holger Barnewitz	Farooq Nasser Al-Jwesm*	Jacques Periaux*, Zhili Tang, Yongbin Chen		
TS10 MS412 Pavement Mechanics and Simulation Mini-Symposium, Chair(s): Silvia Caro						
Harbor A	Methods to Include HMA Heterogeneity at the Multi-Scale Level Using Probabilistic Principles and Simulation Techniques	Characterization of Fracture Properties of Non-Linear, Inelastic Paving Mixtures Using an Integrated Experimental-Computational Approach	Coupling Discrete Element Models with Digital Image Correlation Displacement Fields to Simulate Low Temperature Asphalt Concrete Fracture	Thermal Conductivity of Recycled Asphalt Pavement Particles		
	Daniel Castillo*, Silvia Caro	Taesun You*, Yong-Rak Kim	Brian Hill*, Oliver Giraldo-Londono, William Buttlar, Glaucio Paulino	Eshan Dave*, Christopher DeDene		
TS10 MS407 Cohesive Zone Models - Fundamentals and Multiscale Applications, Chair(s): Kyoungsoo Park, Glaucio H. Paulino						
Harbor B	**Unstructuring Methods for Pervasive Fragmentation Simulations in Three-Dimensions		Accurate Crack Path Representation in a Cohesive Surface Element Approach for Mixed-Mode Fracture Analysis	Modeling of the Transient Energy Release Due to Damage Initiation	Dynamic Cohesive Fracture Simulation for a Material with Microstructure by Using Mesh Adaptivity	
	Daniel Spring*, Glaucio Paulino		Habeun Choi*, Kyoungsoo Park	Konstantinos Baxevanakis*, Jefferson Cuadra, Dani Liu, Antonios Koutsos	Hyunil Baek*, Kyoungsoo Park	

ROOM	8:30 AM	8:50 AM	9:10 AM	9:30 AM	9:50 AM	10:10 AM
TS10 MS1002 Advanced Computational Method and Theory for Predicting Material Behaviors in Various Length Scales, Chair(s): Jeong-Hoon Song						
Harbor C	**Data Driven Inverse Multiscale Design of Materials		Coarse-Grained Molecular Dynamics Simulations of Epoxy Resin During the Curing Process	Molecular Simulation Guided Constitutive Modeling on Finite Viscoelasticity of Elastomers	Mechanics of Weakly-Bonded Incommensurate Atomic Bilayers	A Consistent Homogenization Theory and Numerical Implementation for a Higher Order Plasticity Model from Meso to Macro
	John G. Michopoulos*		Yao Fu*, John Michopoulos, Jeong-Hoon Song	Ying Li*, Shan Tang, Martin Kroger, Wing Kam Liu	Ilia Nikiforov*, Ellad Tadmor	Leong Hien Poh*, Van Tung Phan, ,
TS10 MS805 Advanced Discretization Methods for Interface Problems: Theory, Algorithms and Applications, Chair(s): Andre Massing						
Hillcrest A	Reduced-Order Models of Structural-Acoustic Problems Using XFEM	Interface Control Domain Decomposition Method	Constrained Interpolation Remap for Interface-Capturing Finite Element Methods Applied to Multi-Material Electromagnetics	A Variational Flux Recovery Approach for Elastodynamics Problems with Interfaces		
	Antoine Legay*	Paola Gervasio*, Marco Discacciati, Alfio Quarteroni	Richard Kramer*, Chris Siefert, Tom Voth	Pavel Bochev*, Paul Kuberry		
TS10 MS1005 Multiphysical Modeling of Geomaterials, Chair(s): Qiushi Chen/Craig Foster						
Hillcrest B	Inelasticity and Mixed-Mode Fracture in Porous Rock	Numerical Bifurcation Analysis on Geomaterial Models and Its Application to Coupled Hydro-Mechanical Problems	Multi-Scale and Stochastic Modeling of Organic-Rich Shales: A Probabilistic Bottom-Up Approach	Two-Scale Modeling of Progressive Failure in Partially Saturated Porous Media	A Non-Local Multiscale Discrete-Continuum Model for Granular Materials	
	Craig Foster*, Mohammad Hosein Motamedi, David Weed	Qiushi Chen*, Alejandro Mota	Arash Noshadravan*, Mohammad Mashhadian, Sara Abedi	Xiaoyu Song*, Joshua White	Yang Liu*, WaiChing Sun, Zifeng Yuan, Jacob Fish	

ROOM	8:30 AM	8:50 AM	9:10 AM	9:30 AM	9:50 AM	10:10 AM
TS10 MS306 Computational,Multiscale and Experimental Mechanics of Fibers and Fibrous Materials, Chair(s): Damien Durville						
Hillcrest C	Effect of Fibrillar Material on the In-Plane Strength and Stiffness of Paperboard	Physics-Based Computationa l Modelling of Knitted Textile Architectures	Multi-Scale Seamless Domain Method for Linear and Nonlinear Analyses of Heterogeneou s Materials	A Piecewise Model Order Reduction Method for the Simulation of the Nonlinear Behavior of Wire Ropes		
	Artem Kulachenko*, Armin Halilovic, Hamid Reza Motamedian	Daniel Christe*, Chenyang Mo, Krzysztof Mazur, Aditi Ramadurgakar, Shane Esola, Antonios Kontos	Yoshiro Suzuki*	Nerea Otano Aramendi*, Damien Durville, David Neron, Hodei Usabiaga, Mikel Urchegui		
TS10 MS716 Recent Advances in High Order Finite Element Methods, Chair(s): Leszek Demkowicz						
Hillcrest D	Spacetime Discontinuous Galerkin Method for Hyperbolic AdvectionDiffusion with a Non-Negativity Constraint	Efficiency of High-Order Methods in Space and Time: Study of Elastodynamics Problem Using Spacetime Discontinuous Galerkin Finite Element Method	Reduced Rank Preconditioners	Eliminating the Pollution Effect in Helmholtz Problems by Local Subscale Correction	New Developments on High-Order Hybridized Discontinuous Galerkin Methods	
	Robert Haber*, Raj Pal, Amit Madhukar, Reza Abedi	Reza Abedi*, Scott Miller, Robert Haber, Omid Omidi	Paolo Gatto*, Jan Hesthaven	Daniel Peterseim*	Sriram Murai*, Shinhoo Kang, Tan Bui-Thanh	
TS10 MS404 Recent Advances in Computational Fracture Mechanics, Chair(s): Hiroshi Okada						
Mission Beach A	Application of the Method of Difference Potentials to Linear Elastic Fracture Mechanics	Fatigue Crack Propagation Analysis by Three-Dimensional XFEM Considering Penetration Behavior	Modelling the Fracture Processes of FRP-to-Concrete Interfaces Under Cyclic Actions	Analysis of Interacting Surface Cracks Using the S-Version Finite Element Method		
	Huw Woodward*, Sergei Utyuzhnikov, Patrick Massin	Toshio Nagashima*, Kiminori Murai	Enzo Martinelli*, Antonio Caggiano	Wei Xie*		

ROOM	8:30 AM	8:50 AM	9:10 AM	9:30 AM	9:50 AM	10:10 AM
TS10 MS801 Fluid Structure Interaction Algorithms and Applications, Chair(s): Jason Sheldon						
Mission Beach B	Real-Time PDE-Constrained Optimization Using Databases of Parameterized Reduced-Order Models	A Three-Dimensional Full-Eulerian Approach to Fluid-Structure Interaction Problems Using the Level Set Method	Modeling Fluid-Structure Interaction Using Energy Finite Element Analysis for Bounded and Unbounded Fluid Domains			
	David Amsallem*, Youngsoo Choi, Radek Tezaur, Charbel Farhat	Ping He*, Changwen Mi,	Sergey Medyanik*, Nickolas Vlahopoulos			
TS10 MS201 Advances in Computational Methods for Modeling Transport in Porous Media, Chair(s): Rohan Panchadhara						
Pier	Enhanced Non-Linear Finite Volume Scheme for Multi-Phase Flows	Implementation of Non-Linear Finite Volume Discretization Methods in AD-GPRS	A Coupled Implicit and p-Adaptive Discontinuous Galerkin Method for Miscible Displacement with Adverse Mobility Ratio	Mixed Hybrid Finite Element Modeling of Hydrated Porous Media (Finite Deformation)	Linear Solver Strategy for Coupled and Implicit Discontinuous Galerkin Method to Model Miscible Displacement with Adverse Mobility Ratio	Fourier Law with Embedded Discontinuity
	Kirill Nikitin*, Yuri Vassilevski, Vasiliy Kramarenko, Kirill Terekhov	Kirill Terekhov*, Hamdi Tchelepi, Bradley Mallison	Huafei Sun*, Hao Huang, Aruna Mohan, Jichao Yin, Gauthier Becker, Chris Siefert, Ray Tuminaro	K Malakpoor*, J.M Huyghe, C Yu	Christopher Siefert*, Raymond Tuminaro, Gauthier Becker, Huafei Sun, Jichao Yin, Hao Huang	Ehsan Haghhighat*, S. Pietruszczak
TS10 MS305 Multiscale Modeling and Characterization of Multiphysics for Nano, Bio and Smart Materials, Chair(s): Prof. Xianqiao Wang						
Promenade A	Heat Conduction in Atomistic/Continuum System Based on Coarse-Grained Molecular Dynamics	Hybrid KMC and Continuum Modeling of Surface Reconstruction in Silicon Nanobeams	Modeling Dynamic Shearing Deformations In Living Human Brain with Relevance to Traumatic Brain Injury	Multi-Scale Segmentation of a Unified Creep-Fatigue Crack Growth Model		
	Zhen Zhang*, Jiaoyan Li, James Lee	Amit Singh*, Ellad Tadmor	Nitin Daphalapurkar *, Shailesh Ganpule	K. K. Tang*,		

ROOM	8:30 AM	8:50 AM	9:10 AM	9:30 AM	9:50 AM	10:10 AM
TS10 MS712 Computational Methods for Modeling Interfaces with Complex/Evolving Topologies, Chair(s): Ravindra Duddu, Soheil Soghrati						
Promenade B	**Point Collocation Methods for Free Boundary Problems	An Extended Finite Element Algorithm for the Fracture Analysis of Metal Matrix Composites with Realistic SiC Particle Geometries Obtained from X-Ray Synchrotron Tomography Data	A Hierarchical Interface-Enriched Finite Element Method for the Treatment of Problems with Complex Geometries	A Phantom-Node Approach for Modeling Complex Fracture Networks	A Coupled Eulerian-Lagrangian Extended Finite Element Formulation for Simulating Morphology Evolution Due to Large Deformation of Hyperelastic Solids	
	Stephane Bordas*, Xuan Peng, George Bourantas, Elena Atroshchenko, Satyendra Tomar, Karol Miller, P. Kerfriden	Rui Yuan*, Sudhanshu S. Singh, Nikhilesh Chawla, Jay Oswald	Soheil Soghrati*, Bowen Liang, Hossein Ahmadian, Jorge Barrera Cruz	Chandrasekhar Annavarapu*, Efrem Vitali, Randolph Settgast	Ravindra Duddu*, Louis Foucard, Anup Aryal, Franck Vernerey	

Thursday, July 30, Technical Session 11

ROOM	11:00 AM	11:20 AM	11:40 AM	12:00 PM	12:20 PM	12:40 PM
TS11 MS1012 Advances in Computational Methods for Heterogeneous Materials, Chair(s): Julian Rimoli						
Harbor D	EigenErosion: A Variational Fracture Algorithm in Meshfree Methods	Multi-Scale Investigation of Failure Process in Brittle Polycrystalline Materials at High Strain Rates	Influences of Entrapped Air Voids on the Mechanical and Strengthening Characteristics of Sprayed Fiber Reinforced Polymer Composites: Micromechanical-Based Parametric Analysis			
	Bo Li*, Anna Pandolfi, Michael Ortiz	Hao Jiang*, Zongyue Fan, Bo Li	H. K. Lee*, B. J. Yang			
TS11 MS1007 Computational Modeling of Material Behavior in Extreme Environments, Chair(s): Ben Spencer						
Harbor E	Continuum Damage Model for Hydrogen Embrittlement in Ferritic Steels	Extended Finite Element Method in Multiphysics Nuclear Fuel Simulations				
	Dakshina Valiveti*, Neeraj Thirumalai	Benajmin Spencer*, Ziyu Zhang, John Dolbow				
TS11 MS1001 Microstructure-Governed Material Deformation: Theoretical and Computational Methods, Models and Outcomes, Chair(s): Douglas Spearot						
Harbor G	An Atomistically Validated Continuum Model for Strain Relaxation and Misfit Dislocation Formation	Understanding Nucleation, Growth, and Interaction of Deformation Twins in Hexagonal Materials	Influence of Point Defects and Grain Boundaries on the Mechanical Strength of Monolayer Molybdenum Disulphide (MoS ₂)	Atomic Scale Exploration of Stress Manifestation During Metallic Film Growth	Molecular Dynamics Simulations of Hydrogen Diffusion and Embrittlement in both BCC and FCC Crystal Structures	
	Xiaowang Zhou*, Donald Ward, Jonathan Zimmerman, Jose Luis Cruz-Campa, David Zubia, James E. Martin, Frank B. Van Swol	Jian Wang*	Douglas Spearot*, Khanh Dang	Murat Al*	Tarek M. Hatem*, Mohamed Hamza, Yunes Salman, Jaafar A. El-Awady, Dierk Raabe	

ROOM	11:00 AM	11:20 AM	11:40 AM	12:00 PM	12:20 PM	12:40 PM
TS11 MS714 Voronoi Dual Meshing and Simulation, Chair(s): Scott Mitchell						
Harbor H	Polyhedral Meshing in Industrial Applications: Achievements and Challenges	Geometric Discretization Through Primal-Dual Meshes	VoroCrust Geometry: 3D Polyhedral Meshing with True Voronoi Cells Conforming to Prescribed Surface Points	Feature-Preserving Spatial Density Tuning of a Maximal Random Disk Packing		
	Stefano Paoletti*	Fernando de Goes*, Mathieu Desbrun	Scott Mitchell*, Ahmed Mahmoud, Ahmad Rushdi, Chandrajit Bajaj, John Owens, Mohamed Ebeida	Ahmad Rushdi*		
TS11 MS1009 Integration of Crystal Plasticity into Modeling and Simulations of Materials across Different Length and Time Scales, Chair(s): Anthony Rollett, Minh-Son Pham						
Harbor I	Microstructural Modeling of the Behavior of Crystalline Alloys	Multi-Scale Modeling of Deformation Behavior in Near Beta Ti-5553 Alloy	A Smoothing Technique Based Beta Finite Element Method and Its Application for Modeling Crystal Plasticity			
	Mohammed Zikry*, Qifeng Wu, S. Ziaeи	Sudipto Mandal*, Anthony Rollett, Shanoob Balachandran, Dipankar Banerjee	Wei Zeng*, Guirong Liu			
TS11 MS1011 Mechanical Properties of Randomly Cross-linked Semiflexible Fibrous Materials, Chair(s): Hamed Hatami-Marbini						
Bankers Hill	Non-Linear Mechanics and Cooperative Buckling in Nematic Semiflexible Gels	Non-Affine Behavior of Three-Dimensional Random Fiber Networks	Structural Origins of the Non-Linear Mechanical Response of Fibrin Networks Under Compression			
	Louis C Foucard*, Jordan K Price, William S Klug, Alex J Levine	Hamed Hatami-Marbini*	Oleg Kim*, Rustem Litvinov, John Weisel, Mark Alber			

ROOM	11:00 AM	11:20 AM	11:40 AM	12:00 PM	12:20 PM	12:40 PM
TS11 MS709 Advances in Numerical Methods for Linear and Non-linear Dynamics, Chair(s): Ilinca Stanciulescu						
Cortez Hill A	Damping and Stiffening Forces of a Squeeze-Film Between Two Plates	The Sliding Beam Problem Revisited	Discussion on Structural Inelastic Analysis Using the Force Analogy Method	Non-Linear Dynamic Analysis for Building Structures Based on the Force Analogy Method		
	Shangyi Chen*, Z.C. Feng	Alexander Humer*, Loc Vu-Quoc	Jiting Qu*, Zhongwen Shu, Tingwei Jiang	Gang Li*, Yongqiang Jin, Jialong Li, Feng Zhang		
TS11 MS704 Advances in the Boundary Element Method, Chair(s): Hang Ma						
Cortez Hill B	On the Effectiveness of Buried Elastic Bodies as Passive Vibration Isolators for Foundations Interacting with the Soil	Wave Propagation Analysis for 3D Non-Homogeneous Materials by Using Time-Domain BEM Based on RIM	Multi-Scale Analysis of Stretched Plates by Coupling BEM and FEM and Considering Different Boundary Conditions for the RVE	An Explicit Formula for the Coherent SH Waves' Attenuation Coefficient in Random Porous Materials with Low Porosites	A Comparison Study on the Methods of Selecting Rows and Columns in the Adaptive Cross Approximation BEM	
	Josue Labaki*, Euclides Mesquita,	Liqi Liu*, Haitao Wang, Chenfeng Li	Gabriela Rezende Fernandes*, Jose Julio de Cerqueira Pituba, Eduardo Alberto de Souza Neto	Jun Zhang*, Wenjing Ye	Shuo Huang*, Yijun Liu	
TS11 MS308 Multiscale Modeling of Granular Materials						
Cove	**Computational Modeling of Micro-Fracture Processes Triggering Shear Band Bifurcation in Porous Crystalline Rocks		A Discrete Continuum-Coupling Approach for Predicting Anisotropic Damages in Water-Saturated Brittle Rocks	Non-Equilibrium Thermodynamics of Fault Gouge: Effect of Grain Contact Processes	Numerical Simulations of Granular Behavior in Mining Comminution	Tuning the Bulk Properties of Bi-Disperse Mixtures by Size Ratio
	Ronaldo Borja*, Martin Tjioe		WaiChing Sun*, Kun Wang	Ahmed Elbanna*, Charles Lieou , Jean Carlson	Xiangjun Qiu*	Nishant Kumar*, Vanessa Magnanimo, Stefan Luding
TS11 MS412 Pavement Mechanics and Simulation Mini-Symposium, Chair(s): William Buttlar						
Harbor A	Impact of Material Heterogeneity on the Fracture Properties of Asphalt Mixtures	Numerical Modeling of Raveling in Open Graded Friction Courses (OGFC)				
	Jaime Wills*, Silvia Caro, Andrew Braham	Silvia Caro*, Laura Manrique, Edith Arambula				

ROOM	11:00 AM	11:20 AM	11:40 AM	12:00 PM	12:20 PM	12:40 PM
TS11 MS407 Cohesive Zone Models - Fundamentals and Multiscale Applications, Chair(s): Kyoungsoo Park, Glaucio H. Paulino						
Harbor B	Crack Propagation in Silicon Anode Used in Li-Ion Batteries Based on Li-Ion Concentration Profile of Two-Phase Lithiation	From Diffuse Damage to Sharp Cracks: A Cohesive Extended Finite Element Framework for Crack Propagation	Characterization and Identification of a Cohesive Zone Model for the Adhesion of Plasma Sprayed Coating on Brittle Substrate			
	Yong-Woo Kim*, Tong-Seok Han	Yongxiang Wang*, Haim Waisman	Elodie Pons*, Guillaume Huchet, Rafal Estevez, Jean-Louis Longuet			
TS11 MS1002 Advanced Computational Method and Theory for Predicting Material Behaviors in Various Length Scales, Chair(s): Yao Fu						
Harbor C	Kinetic and Potential Energy Analysis of Molecular Crystals with Emphasis on Chemical Decomposition of Solid Explosives	Grain-Size Dependent Young's Modulus and Poisson's Ratio of Bulk Nanocrystalline Materials	Pattern Characterization and Volume-Integral Micromechanics Model of Elastic and Elastoplastic Heterogeneous Material			
	Brent Kraczek*	Tae-Yeon Kim*, John Dolbow, Eliot Fried	Zeliang Liu*, Wing Kam Liu			
TS11 MS1005 Multiphysical Modeling of Geomaterials, Chair(s): Craig Foster/M.J. Sanchez						
Hillcrest B	Calibration and Validation of A Sand Plasticity Model for Liquefaction Analysis	On Mixed Isogeometric Analysis of Poroelasticity	Simulation of Hydro-Mechanical Behavior of Cementitious Material Using Morphological Model			
	Majid Manzari*	Yared Bekele*, Eivind Fonn, Arne Morten Kvarving, Trond Kvamsdal, Steinar Nordal	Mahban Sadat Hosseini*, Jean-Baptiste Colliat, Nicolas Burlion			

ROOM	11:00 AM	11:20 AM	11:40 AM	12:00 PM	12:20 PM	12:40 PM
TS11 MS306 Computational,Multiscale and Experimental Mechanics of Fibers and Fibrous Materials, Chair(s): Artem Kulachenko						
Hillcrest C	Mesoscopic Modeling of a Wire Strand for the Simulation of the Mechanical Behavior of Electrical Cables	Effects of Atomic-Scale Structure on the Fracture Properties of Amorphous Carbon Carbon Nanotube Composites	Mechanical Behavior of Wooden Members of Historic Buildings Strengthened by FRP Composites	Generalized Unified Formulation Shell Element for Functionally Graded Variable-Stiffness Composite Laminates and Aeroelastic Applications		
	Baptiste Durand*, Damien Durville, Guillaume Vega	Benjamin Jensen*, Kristopher Wise, Gregory Odegard	Yaghob Gholipour*	Enrico Santarpia*, Luciano Demasi, Yonas Ashenafi, Rauno Cavallaro		
TS11 MS414 Recent Advances in Mesh Adaptivity for Inelasticity, Damage, Crack Propagation and Failure., Chair(s): A. Mota						
Hillcrest D	A Solution-Preserving Remeshing and State Mapping Procedure for Large Deformations	Finite Element Simulations of Dynamic Shear Localization in Elasto-Viscoplastic Solids Under Adiabatic Conditions	Remeshing Techniques for 2d Models Using a Smoothed Representation of Recovered Boundaries	Graph Based Adaptive Insertion of Cohesive Elements on Nonsimplicial Meshes	Resolving the Evolution of Pore Structures in 304-L Laser Welds	A Solution-Preserving Remeshing and State Mapping Procedure for Large Deformations
	Michael Veilleux*, James Foulk, John Emery, Alejandro Mota, Jakob Ostien	Hashem Mourad*, Curt Bronkhorst	Harish Radhakrishnan *, Jin Wang, Siddhartha Mukherjee	James Thunes*, Alejandro Mota, James Foulk, Spandan Maiti	James Foulk III*, Michael Veilleux, John Emery, Jonathan Madison, Helena Jin, Alejandro Mota, Jakob Ostien	Michael Veilleux*, James Foulk, John Emery, Alejandro Mota, Jakob Ostien
TS11 MS404 Recent Advances in Computational Fracture Mechanics, Chair(s): Toshio Nagashima						
Mission Beach A	Stabilizing Large-Deformation Elastic-Plastic Analysis of Cracked Model with Partitioned Coupling Method	Crack Propagation Analysis with Fracture Surface Contact Under Torsional Loading	A Method for Fracture Simulation of Concrete Using an Isotropic Damage Model	Interaction Integral Method for Arbitrary Shaped 3-D Cracks and its Application in Crack Propagation Problems	Evolution of Anisotropy in Ductile Fracture Models	
	Yasunori Yusa*, Shinobu Yoshimura	Yoshitaka Wada*	Mao Kurumatani*, Shunitsu Abe, Yuki Nemoto, Yuto Soma, Norikazu Henmi	Hiroshi Okada*, Yuki Wakashima, Hiroshi Kawai	Soondo Kweon*	

ROOM	11:00 AM	11:20 AM	11:40 AM	12:00 PM	12:20 PM	12:40 PM
TS11 MS201 Advances in Computational Methods for Modeling Transport in Porous Media, Chair(s): Laurent White						
Pier	Simulating the Effects of Compaction, Pore-Plugging, and Grain-Crushing on the Permeability and Beta Factor of Porous Media Using Lattice Boltzmann Method	Stabilized Finite Element Methods for Carbon Sequestration Modeling	Enhancing Groundwater Quality Through Computational Modeling and Simulation to Optimize Transport and Interaction Parameters in Porous Media	Tree-Level Hydrodynamic Approach for Improved Stomatal Conductance Parameterization		
	Mayank Tyagi*, Sultan Anbar, Ali Takbiri-Borujeni	Chris Ladubec*, Robert Gracie	Akhil Waghmare*, Padmanabhan Sesaiyer	Golnazalsadat Mirfenderesgi*, Gil Bohrer, Renato Frasson1, Ashley. M Matheny, Karina V. R. Schfer		
TS11 MS305 Multiscale Modeling and Characterization of Multiphysics for Nano, Bio and Smart Materials, Chair(s): Prof. James Lee						
Promenade A	Computational Micromechanics Based Exploration of Strain and Damage Sensing Capabilities in CNT-Polymer Nanocomposites	Molecular Dynamics Studies of the Effect of Initial Chain Orientation on the Shape Recovery Behavior of Polystyrene				
	Gary Seidel*, Adarsh Chaurasia, Xiang Ren	Junghwan Moon*, Joonmyung Choi, Maenghyo Cho				
TS11 MS712 Computational Methods for Modeling Interfaces with Complex/Evolving Topologies, Chair(s): Olga Wodo, Chandrasekhar Annavarapu						
Promenade B	Organic Thin Films: Evaporation, Phase-Separation and Substrate-Patterning Using Diffuse Interface Models	Exact Representation of Interfaces Using Enriched Level-Set Technique	Modeling Topological Effects on Multi-Phase Fluids: Self-Lubricating, Self-Healing and Self-Cleaning Surfaces			
	Baskar Ganapathysubramanian*, Olga Wodo	Hossein Asadi Kalameh*, Olivier Pierard, Eric Bchet	Olga Wodo*, Baskar Ganapathysubramanian,			

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