

# **USNCCM16**

## **Technical Program**

(as of July 27, 2021)

To find specific authors, use the search function in the pdf file.

All times listed are in Central Daylight Saving Time.

# **Monday, July 26**

# TS 1: MONDAY MORNING, JULY 26

10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM
<b>#M103</b>	<b>Symposium Honoring J. Tinsley Oden's Monumental Contributions to Computational Mechanics, Chair(s): Romesh Batra</b>			
<p><b>Keynote presentation:</b> On the Equivalence Between the Multiplicative Hyper-Elasto-Plasticity and the Additive Hypo-Elasto-Plasticity Based on the Modified Kinetic Logarithmic Stress Rate</p> <p><i>Jacob Fish*, Yang Jiao</i></p>	<p>On the Coupling of Classical and Non-Local Models for Applications in Computational Mechanics</p> <p><i>Serge Prudhomme*, Patrick Diehl</i></p>	<p>Fiber-Reinforced Composites: Interface Failures, Convergence Issues, and Sensitivity Analysis</p> <p><i>Maryam Shakiba*, Reza Sepasdar</i></p>	<p>Analysis and Application of Peridynamics to Fracture in Solids and Granular Media</p> <p><i>Prashant K Jha*, Robert Lipton</i></p>	
<b>#M201</b>	<b>Imaging-Based Methods in Computational Medicine, Chair(s): Jessica Zhang</b>			
<p><b>Keynote presentation:</b> Image-Based Computational Modeling of Prostate Cancer Growth to Assist Clinical Decision-Making</p> <p><i>Guillermo Lorenzo*, Thomas J. R. Hughes, Alessandro Reali, Hector Gomez, Thomas E. Yankeelov</i></p>	<p>A PDE-Constrained Optimization Model for the Material Transport Control in Neurons</p> <p><i>Angran Li*, Yongjie Jessica Zhang</i></p>	<p>Image-Based Polygonal Lattices for Mechanical Modeling of Biological Materials: 2D Demonstrations</p> <p><i>Di Liu, Chao Chen, Teng Zhang*</i></p>	<p>Cardiac Motion Estimation from Cine Cardiac MR Images Based on Deformable Image Registration and Mesh Warping</p> <p><i>Brian Wentz, Roshan Upendra, Suzanne Shontz*, Cristian Linte</i></p>	
<b>#M202</b>	<b>Quantification and Modeling of Spatially Heterogeneous Phenomena in Biological Materials, Chair(s): Manuel Rausch, Emma Lejeune, Johannes Weickenmeier</b>			
<p><b>Keynote presentation:</b> Mechanical Consequences of Structural Heterogeneity in Healing Myocardial Scar</p> <p><i>Laura Caggiano, Jeffrey Holmes*</i></p>	<p>Mechanics and Microstructurally Based Modeling of the Passive Right Ventricular Myocardium</p> <p><i>Sotirios Kakaletsis*, Gabriella P. Sugerman, Tomasz Jazwiec, Marcin Malinowski, Tomasz Timek, Manuel Rausch</i></p>	<p>Towards Application Driven Computational Models of Human Induced Pluripotent Stem Cell-Derived Cardiomyocytes</p> <p><i>Emma Lejeune*, Bill Zhao</i></p>	<p>Estimation of Regional Structure-Function Relationship in the Infarcted Left Ventricle</p> <p><i>Emilio Mendiola*, Hamed Babaei, Samer Merchant, Qian Xiang, Edward Hsu, Peter Vanderslice, Reza Avazmohammadi</i></p>	
<b>#M206</b>	<b>Multiphysics and Data-Driven Modeling for Cardiovascular Biomedicine, Chair(s): Debanjan Mukherjee</b>			
<p><b>Keynote presentation:</b> Continuum Modeling of Thromboembolism: Embolization of Formed Clots in a Sudden Expansion</p> <p><i>Nick Tobin, Keefe Manning*</i></p>	<p>Towards the Computational Design of Smart Nanocarriers</p> <p><i>Annalisa Quaini*, Maxim Olshanskii, Alexander Zhiliakov, Shereen Majd, Yifei Wang</i></p>	<p>Computational Model for Biochemical Transport in Large Arterial Thrombus Neighborhood</p> <p><i>Chayut Teeraratkul*, Debanjan Mukherjee</i></p>	<p>Clot Growth Modeling Considering Physical Interactions Between Flow and Blood Cell Components</p> <p><i>Jifu Tan*, Michael Hood</i></p>	

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<b>#M301</b>	<b>Advances and Applications of Mechanistic Machine Learning, Reduced-Order and Data-Driven Analyses, Chair(s): JS Chen, Dong Qian</b>			
<p><b>Keynote presentation:</b> HiDeNN: An AI Platform for Scientific and Materials Systems Innovation</p> <p><i>Wing Kam Liu*</i></p>	<p>Snapshots Construction Using In Situ Visualization Tools for Data-Driven Reduced Order Modeling</p> <p><i>Gabriel Barros, Malu Grave, Jose Camata, Alvaro Coutinho*</i></p>	<p>Mechanistic Machine Learning-Based Multiscale Simulation of Short-Fiber-Reinforced Composites</p> <p><i>C. T. Wu, Haoyan Wei*, Dandan Lyu, Wei Hu, Tung-Huan Su, Hitoshi Oura, Masato Nishi, Tadashi Naito, Leo Shen, Kevin Zhang, Philip Ho, Zeliang Liu, Tianyu Huang</i></p>	<p>SimNet: A Neural Framework for Physics Simulations</p> <p><i>Oliver Hennigh, Susheela Narasimhan, Mohammad Amin Nabian*, Akshay Subramaniam, Kaustubh Tangsali, Max Rietmann, Jose del Aguila Ferrandis, Wonmin Byeon, Zhiwei Fang, Sanjay Choudhry</i></p>	
<b>#M306</b>	<b>Physics-Based Data-Driven Modeling and Uncertainty Quantification in Computational Materials Science and Engineering, Chair(s): Johann Guilleminot</b>			
<p>Gaussian Process Regression Constrained by Boundary Value Problems</p> <p><i>Mamikon Gulian*, Ari Frankel, Laura Swiler</i></p>	<p>Bayesian Calibration of Models for the Self-Assembly of Diblock Copolymers: Likelihood-Free Inference and Expected Information Gain via Measure Transport</p> <p><i>Richardo Baptista, Lianghao Cao*, Joshua Chen, Omar Ghattas, Fengyi Li, Youssef Marzouk, J. Tinsley Oden</i></p>	<p>Point-Cloud Deep Learning of Fluid Flow in Porous Media</p> <p><i>Ali Kashefi*, Tapan Mukerji</i></p>	<p>Stochastic Modeling and Identification of Material Properties on 3D-Printed Structures, with Application to Orthopedic Implants</p> <p><i>Shanshan Chu*, Johann Guilleminot</i></p>	<p>An Adaptive-Sparse Spline Dimensional Decomposition Method for High-Dimensional Uncertainty Quantification</p> <p><i>Steven Dixler*, Ramin Jahanbin, Sharif Rahman</i></p>
<b>#M307</b>	<b>Data-Enhanced Modeling and Uncertainty Quantification of Systems with Multiple Fidelities, Chair(s): Alex Gorodetsky</b>			
<p>Multifidelity UQ Sampling for Stochastic Simulations</p> <p><i>Gianluca Geraci*, Laura Swiler, Bert Deusschere</i></p>	<p>Multilevel Best Linear Unbiased Estimators for Uncertainty Quantification</p> <p><i>Daniel Schaden, Elisabeth Ullmann*</i></p>	<p>Adaptive Basis for Multifidelity Uncertainty Quantification</p> <p><i>Xiaoshu Zeng*, Gianluca Geraci, Michael Eldred, John Jakeman, Alex Gorodetsky, Roger Ghanem</i></p>	<p>Enhancing Multifidelity UQ with Model Tuning</p> <p><i>Michael Eldred*, Gianluca Geraci, Alex Gorodetsky, John Jakeman</i></p>	<p>MXMC: Generalized Multi-Model Monte Carlo Simulation for Uncertainty Propagation</p> <p><i>Geoffrey Bomarito*, James Warner, Patrick Leser, William Leser, Luke Morrill</i></p>

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<b>#M308</b>	<b>Physics-Informed Learning and Data-Enabled Predictive Modeling and Discovery of Complex Systems, Chair(s): Danial Faghihi, Jianxun Wang</b>			
<p><b>Keynote presentation:</b> Low-Dimensional Structure in Bayesian Inference Problems with Mixture Models</p> <p><i>Ricardo Baptista*, Jayanth Jagalur Mohan, Youssef Marzouk</i></p>	<p>Bayesian Inference of a Multiscale Model of Tumor Angiogenesis via Live Cell Imaging, Protein Expression Data, and a 3D Microfluidic Platform</p> <p><i>Caleb Phillips*, Manasa Gadde, Ernesto Lima, Angela Jarrett, M. Nichole Rylander, Thomas Yankeelov</i></p>	<p>A Bayesian Framework for Validation and Selection of Multiscale Plasticity Models with Quantified Uncertainty</p> <p><i>Jingye Tan*, Kathryn Maupin, Danial Faghihi</i></p>	<p>Image-Based Bayesian Inference and Patient Specific Prediction of Heterogeneous Tumor Growth</p> <p><i>Baoshan Liang*, Jingye Tan, Luke Lozensk, David Hormuth, Thomas Yankeelov, Umberto Villa, Danial Faghihi</i></p>	
<b>#M309</b>	<b>Data-Driven Science with Uncertainty Quantification, Machine Learning, and Optimization, Chair(s): Roger Ghanem, Christophe Desceliers</b>			
<p><b>Keynote presentation:</b> A Statistical Finite Element Method (statFEM) for Coherent Synthesis of Observation Data and Model Predictions</p> <p><i>Fehmi Cirak*, Eky Febrianto, Mark Girolami</i></p>	<p>A Probabilistic Artificial Neural Network for a Robust Identification of the Random Apparent Elasticity Tensor Field at Mesoscale</p> <p><i>Christophe Desceliers*, Florent Pled</i></p>	<p>Physics Aware Machine Learning for Structural Topology Optimization</p> <p><i>Jaydeep Rade*, Ethan Herron, Aditya Balu, Soumik Sarkar, Adarsh Krishnamurthy</i></p>		
<b>#M311</b>	<b>Model Order Reduction for Physical Simulations, Chair(s): Matthew Zahr</b>			
<p>Reduced Order Methods for Computational Fluid Dynamics: State of the Art, Perspectives and Applications</p> <p><i>Gianluigi Rozza*</i></p>	<p>Large Eddy Simulation Reduced Order Models</p> <p><i>Traian Iliescu*, Changhong Mou, Birgul Koc</i></p>	<p>Entropy Stable Reduced Order Modeling of Nonlinear Conservation Laws</p> <p><i>Jesse Chan*</i></p>	<p>Hyperreduction for Discontinuous Galerkin Methods: Element- and Point-Wise Reduced Quadrature Formulations with Applications to Aerodynamics</p> <p><i>Masayuki Yano*</i></p>	
<b>#M314</b>	<b>Data-Driven Modeling in Mechanics, Chair(s): Francisco Chinesta</b>			
<p><b>Keynote presentation:</b> A Mechanics-Informed, Data-Driven Approach to Material Modeling and Application to Multiscale Problems</p> <p><i>Faisal As'ad*, Philip Avery, Charbel Farhat</i></p>	<p>Material Hybrid Descriptions Combining Physics Based and Data-Driven Models</p> <p><i>Francisco Chinesta*, Elias Cueto, Victor Champaney, Jean Louis Duval</i></p>	<p>Unsupervised Discovery of Interpretable Hyperelastic Constitutive Laws</p> <p><i>Siddhant Kumar*, Moritz Flaschel, Laura De Lorenzis</i></p>	<p>Learning Constitutive Models with a Non-Intrusive Reduced Basis Method</p> <p><i>Theron Guo*, Karen Veroy</i></p>	

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<b>#M401</b>	<b>Peridynamics and Its Applications, Chair(s): Erdogan Madenci</b>			
<p>Implementation of the Drucker-Prager Model for Ordinary State-Based Peridynamics Using a Local Plastic Multiplier</p> <p><i>Taiki Shimbo*, Tomoki Kawamura, Yutaka Fukumoto</i></p>	<p>The Crushing and Cutting Effects of Drill Bit Cutter on Deep Well Rock Based on Peridynamics</p> <p><i>Jingkai Chen*, Zhangcong Huang, Hualin Liao, Yanting Zhang</i></p>	<p>A Rate-Dependent Peridynamic Optimization Model for Dynamic Mechanical Behavior of Ceramic Materials</p> <p><i>Yaxun Liu*, Lisheng Liu, Qiwen Liu, Hai Mei</i></p>	<p>A Space-Time Discretization of a Nonlinear Peridynamic Model on a 2D Lamina</p> <p><i>Luciano Lopez, Sabrina Francesca Pellegrino*</i></p>	<p>Peridynamic Analysis of Crushing Behavior in Ceramic Open Cell Foams</p> <p><i>Vinzenz Guski*, Kim Lars Haeussler, Anne Uhlenbrock, Siegfried Schmauder</i></p>
<b>#M402</b>	<b>Computational Geomechanics, Chair(s): Qiushi Chen</b>			
<p>Double-Phase-Field Modeling of Mixed-Mode Fracture in Rocks</p> <p><i>Fan Fei*, Jinhyun Choo</i></p>	<p>Dynamic Fracture Simulation of Rock Using a Rate-Dependent Micropolar Peridynamic Model</p> <p><i>Haitao Yu, Xizhuo Chen*</i></p>	<p>Numerical Modeling of Phase Transformation Induced Material Fracture and Crack Propagation</p> <p><i>FNU Sindhusuta*, Sheng-Wei Chi, Craig Foster</i></p>	<p>A Nonlocal Fracture Model for Cohesive-Frictional Materials via a Volume Averaging Approach</p> <p><i>Hojjat Mohammadi*, SeonHong Na</i></p>	
<b>#M403</b>	<b>Computational Fluid Dynamics (CFD) and Fluid-Structure Interaction (FSI): Algorithms and Applications, Chair(s): Jinhui Yan</b>			
<p><b>Keynote presentation:</b> Recent Advances in Computational FSI: Isogeometric and Meshfree Formulations, Boundary Fitted and Immersed Methods, and Applications</p> <p><i>Yuri Bazilevs*</i></p>	<p>A High-Order Fluid Structure Interaction Method: An Extended Approach</p> <p><i>Lauritz Beck*, Florian Kummer</i></p>	<p>An Isogeometric/Finite-Difference Approach to Fluid-Structure Interaction of Thin Shells in Incompressible Flows</p> <p><i>Alessandro Nitti*, Josef Kiendl, Alessandro Reali, Marco de Tullio</i></p>	<p>A Fictitious Domain Formulation for FSI: Finite Element Approximation</p> <p><i>Lucia Gastaldi*</i></p>	
<b>#M405</b>	<b>Peridynamic Theory and Multiscale Methods for Complex Material Behavior, Chair(s): Pablo Seleson</b>			
<p><b>Keynote presentation:</b> Convergence Studies for Meshfree Peridynamic Simulations of Dynamic Crack Growth</p> <p><i>David Littlewood*, Pablo Seleson, Marco Pasetto, Yohan John, Jeremy Trageser</i></p>	<p>A Reproducing Kernel Enhanced Approach for Peridynamic Solutions</p> <p><i>Marco Pasetto*, Yu Leng, Jiun-Shyan Chen, John Foster, Pablo Seleson</i></p>	<p>Interplay Between Grain Shape and Grain Breakage in Crushable Sand Under Shear: A Multiscale Study Based on Physics Engine and Peridynamics</p> <p><i>Jidong Zhao*, Fan Zhu</i></p>	<p>Effect of Particle Shapes on Bulk Behavior Using Peridynamics-Based Discrete Element Method</p> <p><i>Debdeep Bhattacharya*, Lipton Robert</i></p>	

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<b>#M406</b>	<b>Recent Advances and Applications in Meshfree and Particle Methods, Chair(s): Mike Hillman</b>			
<p><b>Keynote presentation:</b> A Variational Multiscale Immersed Reproducing Kernel Particle Method for Fluid-Structure Interaction in Blast Events</p> <p><i>J. S. Chen*, Tsung-Hui (Alex) Huang</i></p>	<p>Weighted High-Order Gradient Collocation Method for Detecting Inverse Boundaries</p> <p><i>Judy Yang*, Hon Fung Samuel Lam</i></p>	<p>Smoothed Particle Hydrodynamics for Hybrid Robot Motion on Granular Terrain</p> <p><i>Guanjin Wang*, Balakumar Balachandran</i></p>	<p>On the Significance of Integration Consistency for Galerkin Meshfree Accuracy</p> <p><i>Dongdong Wang*, Junchao Wu</i></p>	
<b>#M408</b>	<b>Computational Mechanics for Performance and Damage of Materials, Chair(s): Soheil Soghrati</b>			
<p><b>Keynote presentation:</b> Low Dimensional Polynomial Chaos Expansion Performance at Assessing Uncertainty in Creep Life Prediction of Grade 91 Steel</p> <p><i>Timothy Truster*, Amirfarzad Behnam, Varun Gupta, Ramakrishna Tipireddy</i></p>	<p>On the Computational Modelling of Plasticity in the Martensite Phase of TRIP Alloys</p> <p><i>Rui Pedro Cardoso Coelho*, Miguel Vieira de Carvalho, Francisco Manuel Andrade Pires</i></p>	<p>Modeling of the Transformation Ratcheting of Nitinol Using Computational Crystal Plasticity</p> <p><i>Jacob Rusch*, John Moore, Sivom Manchiraju</i></p>	<p>A Physics-Based Crystal Plasticity Model for the Prediction of the Microstructural Evolutions as well as GND and SSD Densities in Metals and Alloys</p> <p><i>Juyoung Jeong*, George Z. Voyiadjis</i></p>	
<b>#M409</b>	<b>Recent Advances in Computational Fracture Mechanics, Chair(s): Adrian Lew</b>			
<p>A Variational Phase-Field Model of Ductile Fracture</p> <p><i>Brandon Talamini*, Andrew Stershic, Michael Tupek</i></p>	<p>Dynamic Brittle Fracture of Thin Shell Structures based on a High-Order Phase Field Approach</p> <p><i>Karsten Paul*, Thomas J.R. Hughes, Chad M. Landis, Roger A. Sauer</i></p>	<p>Stabilized Finite Element Formulation for Phase-Field Fracture in Soft Materials</p> <p><i>Ida Ang*, Bin Li, Nikolaos Bouklas</i></p>	<p>Modeling the Interplay Between Heat Transfer and Crack Propagation in the Phase-Field Method</p> <p><i>Lampros Svolos*, Haim Waisman, Hashem Mourad</i></p>	<p>Phase Field Modeling of Crack Propagation, Deflection and Delamination in Engineered Interfaces</p> <p><i>Vinamra Agrawal*, Brandon Runnels</i></p>
<b>#M413</b>	<b>Advances in High-Order Methods for Computational Fluid Dynamics, Chair(s): Krzysztof Fidkowski</b>			
<p><b>Keynote presentation:</b> High-Order Implicit Shock Tracking: Robust Solvers and Applications</p> <p><i>Tianci Huang*, Matthew Zahr</i></p>	<p>Shock-Capturing for High-Order Compact Schemes via Boundary Variation Diminishing Approach and its Applications</p> <p><i>Amareshwara Sainadh Chamarthi*, Jonathan Hoffmann, Omri Argov, Steven Frankel</i></p>	<p>Continuous Artificial Viscosity Shock Capturing for Hybrid Discontinuous Galerkin Methods on Adapted Meshes</p> <p><i>Krzysztof Fidkowski*</i></p>	<p>Shock Capturing in Nodal Spectral Element Methods Via Riemann Solutions for Intra-Element Fluxes</p> <p><i>Will Trojak*, Tarik Dzanic, Freddie Witherden</i></p>	

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<b>#M415</b>	<b>Model Coupling: Challenges and Connections for Climate and Mechanics, Chair(s): Chad Sockwell</b>			
Analysis of Ocean-Atmosphere Coupling from the Point of View of Domain Decomposition Methods  <i>Florian Lemarié*</i>	An Overlapping Approach for Modelling the Filtration of Fluids in Porous Media  <i>Paola Gervasio*</i>	Hybridizing Superconvergent Spectral Elements and Generalized Weighted Residuals on Irregular Domains via Schwarz Alternation  <i>Rebecca Conley, Xiangmin Jiao*, Jacob Jones</i>	Coupling Free-Flow and Porous Medium with preCICE -- and Other Use Cases  <i>Miriam Mehl*, Alexander Jaust, Benjamin Uekermann</i>	
<b>#M416</b>	<b>Materials Modeling Across Scales: From First Principles Calculations to Mesoscale Physics, Chair(s): Amartya Banerjee</b>			
<b>Keynote presentation:</b> The Atomic Cluster Expansion  <i>Christoph Ortner*</i>	A Data Driven Approach to Improved Exchange-Correlation Functionals in DFT  <i>Bikash Kanungo*, Vikram Gavini</i>	Objective Molecular Dynamics (OMD) Simulation of Dislocation Dynamics  <i>Gunjan Pahlani*, Ananya Renuka Balakrishna, Richard James</i>	Efficient Lattice Green Function Method for Atomistic/Continuum Coupling  <i>Ankit Gupta*, Max Hodapp, William Curtin</i>	
<b>#M418</b>	<b>Computational Methods In Environmental Fluid Mechanics, Chair(s): Ethan Kubatko</b>			
<b>Keynote presentation:</b> Embedding Structures that are not Grid Aligned in Shallow Water Flow  <i>Kyle Mandli*, Chanyang Ryoo, Jiao Li</i>	Progress Toward Global to Coastal Modelling Capabilities within E3SM  <i>Steven Brus*, Luke Van Roekel, Mark Petersen, Qing Li, Nairita Pal, Giacomo Capodaglio, Kristin Barton, Brian Arbic, Andrew Roberts</i>	A Mesh Generator for Storm Surge-Rainfall Events  <i>Younghun Kang*, Ethan Kubatko</i>	A Quadrilateral Mesh Generation Technique with Application to Shallow Water Modeling  <i>Dominik Mattioli*, Ethan Kubatko, Dylan Wood</i>	
<b>#M502</b>	<b>Optimization of Materials and Structures, Including Shape and Topology: Direct and Inverse Problems, Chair(s): Ahmad Najafi</b>			
<b>Keynote presentation:</b> Topology Optimization of Hyperelastic Structures with Anisotropic Fiber Reinforcement under Large Deformations  <i>Shelly Zhang*, Heng Chi, Zhi Zhao</i>	Topology Optimization of Anisotropic Plate Structures with Designable Reinforcement  <i>Hollis Smith*, Julián Norato</i>	Optimization of Material Orientation in Flat Inflatable Structures  <i>Masato Tanaka*, Katsuya Nomura, Tsuyoshi Nomura</i>	Frequency Response Control of Composite Rubber Structures Using Energy-Based Topology Optimization  <i>Hiroya Hoshiba*, Junji Kato</i>	

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<b>#M509</b>	<b>Computational Fluid Mechanics with Free and Moving Boundaries: Methods and Applications, Chair(s): Rekha Rao</b>			
<p><b>Keynote presentation:</b> Numerical Simulation of Incompressible Viscoelastic Flows and Elastic Deformations with Free Surfaces</p> <p><i>Léo Diserens*, Alexandre Caboussat, Marco Picasso</i></p>	<p>Die Shape Optimization Using Feedback Control; Solving the Inverse Problem</p> <p><i>Michelle Spanjaards*, Martien Hulsen, Patrick Anderson</i></p>	<p>Polyurethane Foam Manufacturing Models Using a FEM-Level Set-Population Balance Approach</p> <p><i>Weston Ortiz*, Rekha Rao</i></p>	<p>A Numerical Study of Extensional Flow-Induced Crystallization in Filament Stretching Rheometry</p> <p><i>Patrick Anderson*, Frank van Berlo, Gerrit Peters, Ruth Cardinaels</i></p>	
<b>#M513</b>	<b>Modeling and Simulation for Additive Manufacturing, Chair(s): Albert To</b>			
<p><b>Keynote presentation:</b> Why do Grains Produced by Additive Manufacturing Look So Strange?</p> <p><i>Peter Voorhees*, Alexander Chadwick</i></p>	<p>High Fidelity Numerical Modeling of Dendritic Solidification and Microstructure Evolution in Metal Additive Manufacturing</p> <p><i>Kunal Bhagat, Shiva Rudraraju*</i></p>	<p>Dislocation Microstructure Evolution During Selective Laser Melting of 316L Stainless Steel</p> <p><i>Markus Sudmanns*, Andrew Birnbaum, Yejun Gu, Athanasios Iliopoulos, John Michopoulos, Jaafar A. El-Awady</i></p>	<p>The Importance of Time-Temperature Data Fidelity to Accurate Modeling of Additive Grain Structure: A Cellular Automata Study</p> <p><i>Matt Rolchigo*, Jim Belak, Benjamin Stump</i></p>	
<b>#M614</b>	<b>Polygonal and Polyhedral Discretizations in Computational Mechanics, Chair(s): N. Sukumar</b>			
<p>Topology Optimization with Truncated Octahedron Mesh</p> <p><i>Nikhil Singh*, Anupam Saxena</i></p>	<p>Quadrature for Implicitly-Defined Finite Element Functions on Curvilinear Polygonal Meshes</p> <p><i>Jeffrey Ovall*, Samuel Reynolds</i></p>	<p>Virtual Element Method on Curved Geometries for Acoustic Wave Propagation Analysis</p> <p><i>Ilario Mazzieri*, Alessio Fumagalli, Franco Dassi</i></p>	<p>The Role of Mesh Quality and Mesh Quality Indicators in the Virtual Element Method</p> <p><i>Tommaso Sorgente*, Silvia Biasotti, Gianmarco Manzini, Michela Spagnuolo</i></p>	
<b>#M617</b>	<b>Higher Order FE Methods for Challenging Problems in Science and Engineering, Chair(s): Leszek Demkowicz</b>			
<p><b>Keynote presentation:</b> Least-Squares and DPG Approximation of Eigenvalue</p> <p><i>Fleurianne Bertrand*, Daniele Boffi, Henrik Schneider</i></p>	<p>Least Squares and DPG Approximation of Eigenvalues Problems</p> <p><i>Linda Alzaben, Fleurianne Bertrand, Daniele Boffi*, Henrik Schneider</i></p>	<p>A Goal Oriented Hp Adaptive DPG Scheme</p> <p><i>Ankit Chakraborty*, Ajay Rangarajan, Georg May</i></p>	<p>A Locally L<sup>p</sup>-DPG Method for the Convection-Diffusion Problem</p> <p><i>Jiaqi Li*, Leszek Demkowicz</i></p>	





## TS 2: MONDAY AFTERNOON, JULY 26

2:00 PM	2:20 PM	2:40 PM	3:00 PM	3:20 PM
<b>#M206</b>	<b>Multiphysics and Data-Driven Modeling for Cardiovascular Biomedicine, Chair(s): Adarsh Krishnamurthy</b>			
Numerical Simulation of Cardiac Electromechanics: Multiscale Modeling and Coupling with Closed-Loop Blood Circulation  <i>Luca Dede**, Francesco Regazzoni, Matteo Salvador, Alfio Quarteroni</i>	In Silico Modeling and Data-Driven Analysis of a Novel Transcatheter Valve with Embedded Pressure Sensors  <i>Shantanu Bailoor*, Jung Hee Seo, Lakshmi Prasad Dasi, Stefano Schena, Rajat Mittal</i>	Coupled Left Ventricular and Atrial FSI Simulations with Bioprosthetic Valves  <i>Mehdi Saraeian*, Arian Jafari, Remy Braun, Ming-Chen Hsu, Adarsh Krishnamurthy</i>	Patient-Specific Characterization of Hypoplastic Left Heart Mechanics  <i>Oguz Ziya Tikenogullari*, Matthias Peirlinck, Vijay Vedula, Ellen Kuhl, Alison Lesley Marsden</i>	
<b>#M301</b>	<b>Advances and Applications of Mechanistic Machine Learning, Reduced-Order and Data-Driven Analyses, Chair(s): Waiching Sun, Alvaro Coutinho</b>			
<b>Keynote presentation:</b> Deep Learning of Material Transport in Complex Neurite Networks  <i>Angran Li, Amir Farimani, Jessica Zhang*</i>	Deep Autoencoders for Physics-Constrained Data-Driven Nonlinear Materials Modeling  <i>Xiaolong He*, Qizhi He, J. S. Chen</i>	A Data-Driven Bayesian Crack Nucleation Model for Fatigue in Ni-Based Superalloys  <i>George Weber*, Max Pinz, Somnath Ghosh</i>	Sobolev Training of Thermodynamic-Informed Neural Networks for Interpretable Elasto-Plasticity Models with Level Set Hardening  <i>Nikolas Vlassis*, WaiChing Sun</i>	
<b>#M306</b>	<b>Physics-Based Data-Driven Modeling and Uncertainty Quantification in Computational Materials Science and Engineering, Chair(s): Michael Shields</b>			
Numerical Homogenization and the Arlequin Method  <i>Frederic Legoll*</i>	Stochastic Homogenization and Uncertainty Quantification: A Data-Driven Approach  <i>José Pablo Quesada Molina*, Stefano Mariani</i>	Uncertainty Quantification for Microstructure Reconstruction of Additively Manufactured Microstructures  <i>Arulmurugan Senthilnathan*, Pinar Acar</i>	2D and 3D Microstructure Reconstruction Using a Transfer Learning Approach and Structure-Property Studies  <i>Ashwini Gupta*, Anindya Bhaduri, Lori Graham-Brady</i>	Analytical and Machine Learning Based Uncertainty Quantification for Metallic Microstructures  <i>Md Mahmudul Hasan*, Pinar Acar</i>
<b>#M307</b>	<b>Data-Enhanced Modeling and Uncertainty Quantification of Systems with Multiple Fidelities, Chair(s): Gianluca Geraci</b>			
Learning Coarse-Grained Dynamics from High Fidelity Models  <i>Victor Churchill*, Kailiang Wu, Dongbin Xiu</i>	A Data-Enhanced, Multifidelity, Feasible, Robust, and Versatile Modeling Method  <i>Marie-Jo Azzi*, Charbel Farhat</i>	Multilevel Ensemble Kalman-Bucy Filters  <i>Neil Chada*, Ajay Jasra, Fangyuan Yu</i>	Computational Budget Allocation in Multi-Fidelity Problems with Bandit Learning  <i>Yiming Xu, Vahid Keshavarzadeh, Akil Narayan*</i>	

## TS 2: MONDAY AFTERNOON, JULY 26

2:00 PM	2:20 PM	2:40 PM	3:00 PM	3:20 PM
<b>#M308</b>	<b>Physics-Informed Learning and Data-Enabled Predictive Modeling and Discovery of Complex Systems, Chair(s): Kathryn Maupin and Danial Faghihi</b>			
<p><b>Keynote presentation:</b> Bayesian Learning of Heterogeneous Epidemic Models: Application to COVID-19 Spread Accounting for Long-Term Care Facilities</p> <p><i>Peng Chen*, Keyi Wu, Omar Ghattas</i></p>	<p>Physics-Informed Neural Networks for Geometry Identification of Inhomogeneities</p> <p><i>Enrui Zhang*, Guofei Pang, Ming Dao, George Karniadakis, Subra Suresh</i></p>	<p>Physics Informed Machine Learning For Turbulence Model Uncertainty Estimation</p> <p><i>Jan Felix Heyse*, Aashwin Ananda Mishra, Gianluca Iaccarino</i></p>	<p>Physics-Informed Deep Learning for Solving a Magnetostatic Problem</p> <p><i>Andrés Beltrán-Pulido*, Ilias Bilonis, Dionysios Aliprantis</i></p>	
<b>#M309</b>	<b>Data-Driven Science with Uncertainty Quantification, Machine Learning, and Optimization, Chair(s): Alberto Figueroa, Krishna Garikipati</b>			
<p>A Probabilistic Learning Approach for Uncertainty Quantification of Oil Reservoir Waterflooding</p> <p><i>Fernando Rochinha*, Jeferson Almeida</i></p>	<p>BeltramiNet: A Deep Forward Neural Network for Predicting the Solution of Thermally Coupled Steady State Incompressible Navier Stokes Equations</p> <p><i>Shoaib Goraya*, Nahil Sobh, Arif Masud</i></p>	<p>System Inference for the Spatio-Temporal Evolution of Infectious Diseases: COVID-19 in Michigan and in Mexico</p> <p><i>Mariana Carrasco-Teja*, Zhenlin Wang, Gregory Teichert, Krishna Garikipati</i></p>	<p>Human Mobility and the Outbreak Dynamics of COVID-19</p> <p><i>Kevin Linka*, Mathias Peirlinck, Ellen Kuhl</i></p>	
<b>#M311</b>	<b>Model Order Reduction for Physical Simulations, Chair(s): Masayuki Yano</b>			
<p>Accelerating Lagrangian Hydrodynamics Simulation with Space-time Reduced Order Models</p> <p><i>Dylan Copeland*, Kevin Huynh, Siu Wun Cheung, Youngsoo Choi</i></p>	<p>Least-Squares Petrov--Galerkin Reduced-Order Models for Steady Hypersonic Aerodynamics</p> <p><i>Patrick Blonigan*, David Ching, Marco Arienti, Francesco Rizzi, Jeffrey Fike</i></p>	<p>Nonlinear Projection-Based Model Order Reduction in the Presence of Adaptive Mesh Refinement</p> <p><i>Clayton Little*, Charbel Farhat</i></p>	<p>Reduced-Order Modeling for Hydrodynamics Simulation of the Rayleigh–Taylor Instability</p> <p><i>Siu Wun Cheung*, Youngsoo Choi, Dylan Copeland, Kevin Huynh</i></p>	
<b>#M314</b>	<b>Data-Driven Modeling in Mechanics, Chair(s): Laura De Lorenzis</b>			
<p>Establishing a Data-Driven Deformation Model for Tin Using Symbolic Regression and Genetic Programming</p> <p><i>David Montes de Oca Zapiain*, Hojun Lim, Jay D. Carroll, Zachary Casias, Corbett Battaile, J. Matthew D. Lane</i></p>	<p>Data-Driven Inverse Design of Truss Lattices with Tunable Anisotropy</p> <p><i>Jan-Hendrik Bastek*, Siddhant Kumar, Dennis M. Kochmann</i></p>	<p>Accelerating the Simulation of Highly Stiff HVAC Systems with Continuous-Time Echo State Networks</p> <p><i>Christopher Rackauckas*</i></p>		

## TS 2: MONDAY AFTERNOON, JULY 26

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<b>#M401</b>	<b>Peridynamics and Its Applications, Chair(s): Selda Oterkus</b>			
Computational Periporomechanics for Modeling Dynamic Failure of Porous Media  <i>Xiaoyu Song*, Shashank Menon</i>	A Bond-Based Peridynamic Model for Coupled Heat Transfer and Water Flow with Phase Change Effects  <i>Petr Nikolaev*, Majid Sedighi, Andrey Jivkov, Lee Margetts</i>	Peridynamic Modelling of Desiccation Induced Cracking of Cohesive Soils  <i>Huaxiang Yan*, Majid Sedighi, Andrey Jivkov</i>	A Coupled Peridynamic and Finite Element Approach in ANSYS Framework for Fatigue Life Prediction Based on the Kinetic Theory of Fracture <i>Yanan Zhang, Erdogan Madenci*</i>	Peridynamic Micromechanics of Composites Materials (CM) of Random Structures  <i>Valeriy Buryachenko*</i>
<b>#M402</b>	<b>Computational Geomechanics, Chair(s): Shabnam Semnani</b>			
Simulation of Earthquake-Triggered Landslides and Site Response Using the Material Point Method  <i>Abdelrahman Alsardi*, Alba Yerro</i>	Non-Local Reformulation for the Transport of Fluids in Heterogeneous Unsaturated Porous Media  <i>Haitao Yu, Yuqi Sun*</i>	A Higher-Order Thermo-Mechanical Homogenization Method for Heterogeneous Porous Material  <i>Bozo Vazic*, Pania Newell</i>	A Homogenization Framework for Inelastic Layered Porous Materials  <i>Shabnam J. Semnani*, Joshua A. White</i>	Domain Partitioning Material Point Method for Evolving Multi-Body Thermal-Mechanical Contacts and Fragmentation  <i>Mian Xiao, Chuanqi Liu, WaiChing Sun*</i>
<b>#M403</b>	<b>Computational Fluid Dynamics (CFD) and Fluid-Structure Interaction (FSI): Algorithms and Applications, Chair(s): John Evans</b>			
Fluid-Shell Interactions Using Non-Intrusive Coupling Based on the Immersed Finite Element Method  <i>Narendra Nanal*, Lucy Zhang, Scott Miller, Jesse Thomas</i>	Blast-on-Structure Simulations Using Zapotec  <i>Scott Miller*, Guy Bergel, Gabriel de Frias, Kevin Marktelow, Matthew Mosby, Julia Plews, Jesse Thomas, Ellen Wagman</i>	Numerical Methods for Tracking Topological Changes in Multiphase Fluid-Structure Interaction Simulations  <i>Wentao Ma*, Xuning Zhao, Shafquat Islam, Kevin Wang</i>	Non-Matching Interface Fluid-Structure Interaction Modeling for Compressible Flow Problems  <i>Manoj R. Rajanna*, Emily L. Johnson, Ning Liu, Jim Lua, Ming-Chen Hsu</i>	A Sharp Interface Lagrangian-Eulerian Fluid-Structure Interaction Approach for Simulating the Migration and Trapping of Deformable Blood Clots  <i>Ebrahim Kolahoduz*, Kenneth Aycock, Brent Craven, Boyce Griffith</i>
<b>#M405</b>	<b>Peridynamic Theory and Multiscale Methods for Complex Material Behavior, Chair(s): Patrick Diehl</b>			
Implementation of Local Boundary Conditions in Nonlocal Wave Propagation  <i>Burak Aksoylu*</i>	A Generalized Peridynamic Framework for Modeling Corrosion Mechanics, Damage and Failure  <i>Srujan Rokkam*, Masoud Behazadinasab, Max Gunzburger, Nam Phan, Sachin Shanbhag</i>	A Peridynamic Model of Degradation in Concrete  <i>Jeremy Trageser*, Jessica Rimsza, Reese Jones, Joshua Hogancamp</i>	Continuum-Kinematics-Inspired Peridynamics  <i>Soheil Firooz*, Paul Steinmann, Ali Javili</i>	A General Method to Evaluate Bond Micromoduli for Anisotropic Bond-Based Peridynamics Models  <i>Naveen Prakash*</i>

## TS 2: MONDAY AFTERNOON, JULY 26

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<b>#M406</b>	<b>Recent Advances and Applications in Meshfree and Particle Methods, Chair(s): John T. Foster</b>			
<p><b>Keynote presentation:</b> Variationally Consistent Naturally Stabilized Thermo-Mechanical Meshfree Formulation</p> <p><i>Kuan-Chung Lin, Michael Hillman*</i></p>	<p>A Discontinuous Cohesive Reproducing Kernel Finite Volume Method for Brittle Fracture Simulation</p> <p><i>Saili Yang*, Michael Hillman</i></p>	<p>A Locking-Free Variational Multiscale Meshfree Method for Reissner-Mindlin Plate Formulation</p> <p><i>Tsung-Hui (Alex) Huang*</i></p>	<p>A Lagrangian Naturally Stabilized Meshfree Method</p> <p><i>Jiarui Wang*, Michael Hillman</i></p>	
<b>#M408</b>	<b>Computational Mechanics for Performance and Damage of Materials, Chair(s): Varun Gupta</b>			
<p>A Variational Phase-Field Model for Ductile Fracture with Coalescence Dissipation</p> <p><i>Tianchen (Gary) Hu*, John Dolbow, Brandon Talamini, Andrew Stershic, Michael Tupek</i></p>	<p>Modeling Crack Nucleation and Propagation in Anisotropic Materials</p> <p><i>Bryce Mazurowski*, Patrick O'Hara, C. Armando Duarte</i></p>	<p>Predicting the Influence of an Interface in Dynamic Brittle Fracture of PMMA</p> <p><i>Longzhen Wang*, Javad Mehrmashhadi, Florin Bobaru</i></p>	<p>Discrete Modeling of Reinforced Concrete Panels and Columns Subject to Spherical Near-Field Air Blasts</p> <p><i>Matthew Troemner*, Gianluca Cusatis, Photios Papadros</i></p>	
<b>#M409</b>	<b>Recent Advances in Computational Fracture Mechanics, Chair(s): John Dolbow</b>			
<p><b>Keynote presentation:</b> Nucleation in the Phase-Field Approach to Brittle Fracture</p> <p><i>Aditya Kumar*, Oscar Lopez-Pamies</i></p>	<p>A Micromechanics-Informed Phase Field Model for Brittle and Ductile Fracture Accounting for Unilateral Constraint</p> <p><i>Yongxing Shen*, Yangyuanchen Liu, Cheng Cheng, Vahid Ziaei-Rad, Shuo Yang</i></p>	<p>An Arc-Length Stabilized Adaptive Wavelet-Enriched Hierarchical Finite Element Method for Crack Propagation Using Phase Field Models</p> <p><i>Saikat Dan*, Thirupathi Maloth, Preetam Tarafder, Somnath Ghosh</i></p>	<p>Affine Similar Trust-Region Method with Application to Phase-Field Models of Brittle Fracture</p> <p><i>Alena Kopanicakova*, Rolf Krause</i></p>	
<b>#M413</b>	<b>Advances in High-Order Methods for Computational Fluid Dynamics, Chair(s): Chunlei Liang</b>			
<p><b>Keynote presentation:</b> Finding Flows of a Navier-Stokes Fluid through Quantum Computing</p> <p><i>Frank Gaitan*</i></p>	<p>An Efficient Benchmark Case for Scale-Resolving Simulation with Curved Walls</p> <p><i>Z.J. Wang*, Eduardo Jourdan</i></p>	<p>Explicit Time Stepping for SUPG Stabilized Finite Element Methods</p> <p><i>Jay Appleton*, Brian Helenbrook</i></p>	<p>Recent Developments in Recovery-based Discontinuous Galerkin</p> <p><i>Loc Khieu*, Philip Johnson, Eric Johnsen</i></p>	

## TS 2: MONDAY AFTERNOON, JULY 26

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<b>#M414</b>	<b>Computational Methods for Modelling Stationary and Non-Stationary Interfaces at Multiple Scales, Chair(s): Nikhil Chandra Admal</b>			
<p><b>Keynote presentation:</b> Phase-Field Nano- and Scale-Free Approaches to Interaction between Martensitic Phase Transformations and Plasticity</p> <p><i>Valery I. Levitas*</i></p>	<p>Phase Field Disconnections: Exploring Complex Grain Boundary Migration from the Mesoscale Perspective</p> <p><i>Brandon Runnels*</i></p>	<p>A Thresholding Method for the Kobayashi-Warren-Carter Grain Boundary Model with General Mobilities</p> <p><i>Jaekwang Kim*, Matt Jacobs, Nikhil Admal</i></p>	<p>A Disconnection-Based Diffuse-Interface Approach to Model Grain Boundary Motion</p> <p><i>Himanshu Joshi, Junyan He*, Nikhil Admal</i></p>	
<b>#M416</b>	<b>Materials Modeling Across Scales: From First Principles Calculations to Mesoscale Physics, Chair(s): Vikram Gavini</b>			
<p>Using First-Principles Calculations to Predict the Mechanical Properties of Transmuting Tungsten Under First Wall Fusion Power-Plant Conditions</p> <p><i>David Cereceda*, Yichen Qian, Mark Gilbert, Lucile Dezerald</i></p>	<p>Stationary Dislocation at Stress Much Lower than the Peierls Stress</p> <p><i>Hao Chen*, Valery Levitas, Liming Xiong, Xiancheng Zhang</i></p>	<p>Stability and Length Scales of Dislocation Walls: Analysis via Monte Carlo-Discrete Dislocation Dynamics</p> <p><i>Nipal Deka*, Ryan Sills</i></p>	<p>Dislocation Transmission Across Sigma 3 {112} Incoherent Twin Boundary: Combined Atomistic and Phase-Field Study</p> <p><i>Hyojung Kim*, Tengfei Ma, Nithin Mathew, Darby J. Luscher, Lei Cao, Abigail Hunter</i></p>	
<b>#M418</b>	<b>Computational Methods In Environmental Fluid Mechanics, Chair(s): Ethan Kubatko</b>			
<p>Entropy Stable, Well-Balanced, and Subcell Positivity Preserving DG Methods for the Shallow Water Equations</p> <p><i>Philip Wu*, Jesse Chan</i></p>	<p>Implicit Advection: Increased Robustness for Dynamical Cores</p> <p><i>James Woodfield*, Hilary Weller, Colin Cotter</i></p>	<p>A Numerical Analysis of the Mixed and the Primal Hybrid Finite Element Methods to Solve the Poisson's Equation: Accuracy, Simulation Time and A-Posteriori Error Estimation</p> <p><i>Victor Brighenti Oliari*, Denise de Siqueira, Philippe Remy Bernard Devloo</i></p>	<p>An Adaptive Space-Time FE Method for the Shallow Water Equations</p> <p><i>Eirik Valseth*, Clint Dawson</i></p>	
<b>#M502</b>	<b>Optimization of Materials and Structures, Including Shape and Topology: Direct and Inverse Problems, Chair(s): Oliver Giraldo-Londoño</b>			
<p>Topology Optimization Considering Uncertainties via Stochastic Reduced Order Models</p> <p><i>Alberto Torres*, James Warner, James Guest, Miguel Aguilo</i></p>	<p>Reliability-Based Shape Design Optimization under Dependent Random Variables by a Generalized Polynomial Chaos Expansion</p> <p><i>Dongjin Lee*, Sharif Rahman</i></p>	<p>Use of Stochastic Gradient Descent for Topology Optimization under Reliability Constraints</p> <p><i>Subhayan De*, Kurt Maute, Alireza Doostan</i></p>	<p>Momentum-Based Accelerated Mirror Descent Stochastic Approximation for Robust Topology Optimization under Stochastic Loads</p> <p><i>Weichen Li*, Shelly Zhang</i></p>	

## TS 2: MONDAY AFTERNOON, JULY 26

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<b>#M509</b>				
<b>Computational Fluid Mechanics with Free and Moving Boundaries: Methods and Applications, Chair(s): Kristianto Tjiptowidjojo</b>				
Fluid-Structure Interaction (FSI) Resolution for Cerebral Aneurysm Behaviour.  <i>Elie Hachem*, Ramy Nemer, Thomas Foliard, Aurelien Larcher</i>	Direct Numerical Simulations of Red Blood Cells in Viscoelastic Fluid Flows  <i>Boon Siong Neo*, Mehdi Niazi Ardekani, Eric Shaqfeh</i>	Shape Dynamics of a Red Blood Cell in Microcirculation  <i>Dhwanit Agarwal*, George Biros</i>	Flow of a Capsule Suspended in a Newtonian Liquid through a Constricted Capillary  <i>Jose Roca, Ivan Menezes, Marcio Carvalho*</i>	Computational Models for Fluid-to-Solid Transitions in Yield Stress Fluids  <i>Josh McConnell*, Weston Ortiz, Anne Grillet, Pania Newell, Rekha Rao</i>
<b>#M513</b>				
<b>Modeling and Simulation for Additive Manufacturing, Chair(s): W. Cai</b>				
Predicting Microstructure-Dependent Mechanical Properties in Additively Manufactured Metals Using Machine- and Deep-Learning Methods  <i>Carl Herriott, Ashley Spear*</i>	The AFRL AM Modeling Challenge: Predicting Micromechanical Fields in AM IN625 Using an FFT-Based Method with Direct Input from a 3D Microstructural Image  <i>Carter Cocke*, Anthony Rollett, Ricardo Lebensohn, Ashley Spear</i>	Simulation of Microstructure Development in Additively Manufactured Nickel Superalloys through CA-FE Modelling Methods  <i>Madie Allen*, Tyler London, James Campbell</i>	Utilizing the Cellular Automata Finite Element Model to Simulate Thin Wall Microstructures of 3D Printed Metals  <i>Lukasz Kuna*, Kirubel Teferra</i>	
<b>#M614</b>				
<b>Polygonal and Polyhedral Discretizations in Computational Mechanics, Chair(s): Joe Bishop</b>				
<b>Keynote presentation:</b> Direct Serendipity and Mixed Finite Elements on Convex Polygons  <i>Todd Arbogast*, Zhen Tao, Chuning Wang</i>	Virtual Elements on Agglomerated Finite Elements to Increase the Critical Time Step in Explicit Three-Dimensional Elastodynamic Simulations  <i>N. Sukumar*, Michael Tupek</i>	The Virtual Element Method for Magneto-Hydrodynamics in Polygonal Meshes  <i>Sebastian Naranjo*, Vrushali Bokil, Vitaliy Gyrya, Gianmarco Manzini</i>	The Arbitrary-Order Virtual Element Method for Linear Elastodynamics Models  <i>Gianmarco Manzini*, Paola Antonietti, Ilario Mazzieri, Hashem Mourad, Marco Verani</i>	
<b>#M617</b>				
<b>Higher Order FE Methods for Challenging Problems in Science and Engineering, Chair(s): Maciej Paszynski</b>				
The Source Transfer Domain Decomposition Preconditioner for High-Frequency Time-Harmonic Maxwell Equations  <i>Socratis Petrides*, Dylan Copeland, Tzanio Kolev</i>	An hp-HDG Approach for Anisotropic Diffusions  <i>Geonyeong Lee*, Jau-Wei Chen, Tan Bui-Thanh</i>	Space-Time Continuous Galerkin hp-Finite Elements for Nonlinear Heat Problems  <i>Philipp Kopp*, Stefan Kollmannsberger, Ernst Rank, Victor Calo</i>	A Painless Goal-Oriented hp-Adaptive Strategy for Indefinite Problems  <i>Felipe Caro*, Vincent Darrigrand, Elisabete Alberdi</i>	Exploiting Tensor-Product Structure in High-Order Finite Elements on Next-Generation Architectures  <i>Nathan Roberts*, Mauro Perego</i>

## TS 3: MONDAY EVENING, JULY 26

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<b>#M201</b>	<b>Imaging-Based Methods in Computational Medicine, Chair(s): Maria Holland</b>			
<p>Probabilistic Modeling of Tau Propagation in Alzheimer's Disease</p> <p><i>Amelie Schaefer*, Mathias Peirlinck, Kevin Linka, Ellen Kuhl</i></p>	<p>Spatiotemporal Atrophy Patterns in Healthy Brain Aging and Alzheimer's Disease</p> <p><i>Yana Blinkouskaya*, Johannes Weickenmeier</i></p>	<p>Probing the Mechanical Principle of 3-Hinge Gyral Formation and its Role in Brain Networks</p> <p><i>Xianqiao Wang*</i></p>	<p>Predicting the Damages in the asculature of the Brain from Traumatic Brain Injuries with an MRI Based Computational Framework</p> <p><i>Vickie Shim*, Samantha Holdsworth, Taerin Lee, Shaofan Li, Micheal Dragunow</i></p>	
<b>#M202</b>	<b>Quantification and Modeling of Spatially Heterogeneous Phenomena in Biological Materials, Chair(s): Manuel Rausch, Emma Lejeune, Johannes Weickenmeier</b>			
<p><b>Keynote presentation:</b> An Inverse Modelling Study on the Local Volume Changes During Early Morphoelastic Growth of the Fetal Human Brain</p> <p><i>Z. Wang, B.T. Martin, J. Weickenmeier, Krishna Garikipati*</i></p>	<p>Assessing the Heterogeneous In Vivo Kinematics and Properties of the Human Aorta Using DENSE MRI to Improve Patient-Specific Computational Modeling and Clinical Diagnostics</p> <p><i>John Wilson*, Johane Bracamonte, Patrick Jones, Muhammad Islam, John Oshinski, Joao Soares</i></p>	<p>A New Biomarker for the Assessment of Mechanical Heterogeneity in Biological Tissue</p> <p><i>Dieter Klatt*, Harish Palnitkar, Rolf Reiter, Shreyan Majumdar, Joseph Crutison, Shujun Lin, Thomas Royston</i></p>	<p>Coupling Hemodynamics with Mechanobiology in Patient-Specific Computational Models of Ascending Thoracic Aortic Aneurysms</p> <p><i>Joan Laubrie*, Jamal Mousavi, Raja Jayendiran, Stéphane Avril</i></p>	
<b>#M206</b>	<b>Multiphysics and Data-Driven Modeling for Cardiovascular Biomedicine, Chair(s): Ming-Chen Hsu</b>			
<p><b>Keynote presentation:</b> A Versatile Computational Framework For Scalar Transport In Cardiovascular Simulations</p> <p><i>Sabrina Lynch, Christopher Arthurs, Nitesh Nama, Onkar Sahni, C. Alberto Figueroa*</i></p>	<p>Computational Modeling of Fluid-Poro-hyperelastic Structure Interaction</p> <p><i>Martina Bukac*, Anyastassia Seboldt</i></p>	<p>Comparison of Membrane, Shell, and 3D Solid Formulations for Vascular Biomechanics</p> <p><i>Nitesh Nama*, Miquel Aguirre, Rogelio Ortigosa, Antonio J. Gil, Jay D. Humphrey, C. Alberto Figueroa</i></p>		



### TS 3: MONDAY EVENING, JULY 26

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<b>#M301 Advances and Applications of Mechanistic Machine Learning, Reduced-Order and Data-Driven Analyses, Chair(s): Jessica Zhang, Haoyan Wei</b>				
<p>HiDeNN-PGD: Reduced Order Deep Learning Network</p> <p><i>Lei Zhang*, Ye Lu, Shaoqiang Tang, Wing Kam Liu</i></p>	<p>Hierarchical Deep-Learning Neural Networks for Physics Discovery and Mechanical Design</p> <p><i>Hengyang Li*, Abdullah Amin, Wing Kam Liu</i></p>	<p>Deep Learning Model to Predict Complex Stress and Strain Fields in Hierarchical Composites</p> <p><i>Zhenze Yang*, Chi-Hua Yu, Markus Buehler</i></p>	<p>A Fully Convolutional Neural Network Framework for Accelerating Representative Volume Element Analysis, Microscale Material Identification, and Defect Characterization</p> <p><i>Lin Cheng*, Gregory Wagner</i></p>	<p>A Machine Learning Based Data Compression Strategy for Transient Simulations.</p> <p><i>Sujal Tipnis*, Rishikesh Ranade, Jay Pathak</i></p>
<b>#M306 Physics-Based Data-Driven Modeling and Uncertainty Quantification in Computational Materials Science and Engineering, Chair(s): Lori Graham-Brady</b>				
<p>Data Assimilation and Mixed-Variable Metamodeling with Latent Map Gaussian Processes</p> <p><i>Nicholas Oune, Ramin Bostanabad*</i></p>	<p>Uncertainty Quantified Parametrically Homogenized Constitutive Model for Polycrystalline Titanium Alloys</p> <p><i>Shravan Kotha*, Deniz Ozturk, Somnath Ghosh</i></p>	<p>An Image-Based Deep Learning Approach to Predict Crack in 2D Representations of Composites</p> <p><i>Reza Sepasdar*, Maryam Shakiba</i></p>	<p>Stochastic Fatigue Model Identification for Welded Joints Based on Structural Experimental Data</p> <p><i>Han Guo*, Pierre Feissel, Frédéric Druesne, Nikolaos Limnios, Salim Bouzebda, Alain Patigniez, Stephane Bouyaux</i></p>	<p>A Backward Compatible Physics Informed Neural Networks for Solving Nonlinear and Higher Order Partial Differential Equations</p> <p><i>Revanth Matthey, Susanta Ghosh*</i></p>
<b>#M307 Data-Enhanced Modeling and Uncertainty Quantification of Systems with Multiple Fidelities, Chair(s): Gianluca Geraci</b>				
<p>CMLMC Algorithms for the Estimation of Risk Measures for Optimal Design</p> <p><i>Quentin Ayoul-Guilmond, Sundar Ganesh*, Fabio Nobile</i></p>	<p>Multifidelity Multiobjective Optimization for Wake Steering Strategies</p> <p><i>Julian Quick*, Ryan King, Peter Hamlington</i></p>	<p>Adaptive and Efficient Rare Event Analysis Using a Gaussian Process Modeling Fidelity Recommender System</p> <p><i>Som Dhulipala*, Michael Shields, Benjamin Spencer, Chandrakanth Bolisetti, Andrew Slaughter, Vincent Laboure, Promit Chakraborty</i></p>	<p>Multilevel Estimators for Measures of Robustness in Optimization Under Uncertainty</p> <p><i>Friedrich Menhorn*, Gianluca Geraci, Daniel T. Seidl, Michael S. Eldred, Hans-Joachim Bungartz, Youssef M. Marzouk</i></p>	<p>Estimating Approximate Control Variate Weights: with Applications in Importance Sampling and Rare Event Estimation</p> <p><i>Alex Gorodetsky*, Trung Pham</i></p>

## TS 3: MONDAY EVENING, JULY 26

4:00 PM	4:20 PM	4:40 PM	5:00 PM	5:20 PM
<b>#M308</b>	<b>Physics-Informed Learning and Data-Enabled Predictive Modeling and Discovery of Complex Systems, Chair(s): Jianxun Wang, Kathryn Maupin</b>			
Machine Learning Constitutive Models  <i>Reese Jones*, Ari Frankel</i>	Enhanced Data Efficiency Using Deep Neural Networks and Gaussian Processes for Aerodynamic Design Optimization  <i>Ashwin Renganathan, Romit Maulik*, Jai Ahuja</i>	Predict Fracture Stress of Poly-Crystalline Graphene Using Deep Learning  <i>MD Imrul Reza Shishir*, Mohan Surya Raja Elapolu, Alireza Tabarraei</i>	Quantification of Margins and Uncertainty Using Dakota for a Multiphysics Mechanical Thermal Analysis Workflow  <i>Andrew Murphy*, Michael Stender, Brent Houchens, Lauren Beghini</i>	
<b>#M309</b>	<b>Data-Driven Science with Uncertainty Quantification, Machine Learning, and Optimization, Chair(s): Jim Stewart, Roger Ghanem</b>			
Keynote presentation: Grassmannian Diffusion Maps Based Manifold Learning for Uncertainty Quantification  <i>Michael Shields*, Dimitris Giovanis, Ketson dos Santos</i>	Reduced Order Models Using a Non-Local Calculus on Finite Weighted Graphs  <i>Matthew Dushenes*, Krishna Garikipati</i>	Manifold-Based Optimization for Constrained Trajectories  <i>Cosmin Safta, Kelli McCoy*, Roger Ghanem</i>		
<b>#M311</b>	<b>Model Order Reduction for Physical Simulations, Chair(s): Youngsoo Choi</b>			
Hybrid Data-Driven Reduced Order Models for the 3D Turbulent Channel Flow  <i>Changhong Mou*, Honghu Liu, Leo Reibold, Traian Iliescu</i>	An Adaptive Multi-Fidelity Ensemble Kalman Filter Using Hyperreduced ROMs  <i>Geoff Donoghue*, Masa Yano</i>	Dynamical Modeling and Control of Fluid-Structure Interaction: From High-Fidelity to Data-Driven Computing  <i>Amir Chizfahm*, Rajeev Jaiman</i>	Reduction of Fluid-Structure-Control Problems and Application to Model Predictive Control  <i>Andrew McClellan*, Charbel Farhat</i>	
<b>#M314</b>	<b>Data-Driven Modeling in Mechanics, Chair(s): Michael Ortiz</b>			
Model-Free Data-Driven Fracture Mechanics  <i>Pietro Carrara*, Laura De Lorenzis, Laurent Stainier, Michael Ortiz</i>	A Probabilistic Model-Free Data-Driven Solver Scheme  <i>Erik Prume*, Robert Eggersmann, Stefanie Reese, Michael Ortiz</i>	Thermodynamics-Informed Neural Networks  <i>Quercus Hernandez, Beatriz Moya, Alberto Badias, David González, Francisco Chinesta, Elias Cueto*</i>	A Data-Driven Computational Approach Applied to a FE2 Multiscale Method for History-Dependent Materials  <i>Paul-William Gerbaud*, Pierre Ladevèze, David Néron</i>	

## TS 3: MONDAY EVENING, JULY 26

4:00 PM	4:20 PM	4:40 PM	5:00 PM	5:20 PM
<b>#M403</b>	<b>Computational Fluid Dynamics (CFD) and Fluid-Structure Interaction (FSI): Algorithms and Applications, Chair(s): Yue Yu</b>			
<p><b>Keynote presentation:</b> Over-Coming Fluid-Structure Instabilities for Incompressible Flows and Light Bodies</p> <p><i>William Henshaw*</i></p>	<p>Output-Based Mesh Adaptation for Fluid-Structure Interaction Simulations</p> <p><i>Vivek Ojha*, Krzysztof Fidkowski, Carlos Cesnik</i></p>	<p>Semi-Implicit Eulerian Formulation Using Marker Particles with a Reference Map for Fluid-Structure Interaction Problems</p> <p><i>Koji Nishiguchi*, Tokimasa Shimada, Hiroya Hoshiba, Junji Kato</i></p>	<p>A Solution Strategy for Fluid-Structure Interaction Using the Unified Continuum Formulation, Quasi-Direct Coupling, and Nested Block Preconditioning</p> <p><i>Ju Liu*</i></p>	
<b>#M405</b>	<b>Peridynamic Theory and Multiscale Methods for Complex Material Behavior, Chair(s): Fei Han</b>			
<p><b>Keynote presentation:</b> Quasistatic Fracture Using Nonlinear-Nonlocal Elastostatics with an Analytic Tangent Stiffness Matrix</p> <p><i>Patrick Diehl*</i></p>	<p>A New Peridynamic Framework for Discrete Dislocation Dynamics in 2D Crystal Plasticity</p> <p><i>Ziguang Chen*, Wenbo Dong, Florin Bobaru, Minsheng Huang</i></p>	<p>A Spatiotemporal Nonlocal Homogenization Framework for Thermomechanical Response of Heterogeneous Materials</p> <p><i>Linjuan Wang*, Jifeng Xu, Jianxiang Wang, Bhushan Karihaloo</i></p>	<p>Modeling Blasting Induced Rock Fractures with Non-Ordinary State-Based Peridynamics</p> <p><i>Fan Zhu*, Jidong Zhao</i></p>	
<b>#M406</b>	<b>Recent Advances and Applications in Meshfree and Particle Methods, Chair(s): John T. Foster</b>			
<p><b>Keynote presentation:</b> The Kinetic Relations of Linear Elastic Fracture Mechanics from Nonlocal Dynamics</p> <p><i>Prashant Jha, Robert Lipton*</i></p>	<p>Development of Time-Discontinuous Peridynamic Method for Transient Crack Propagation Problems</p> <p><i>Zhenhai Liu*, Hongfei Ye, Dong Qian, Hongwu Zhang, Yonggang Zheng</i></p>	<p>A Total Lagrangian Material Point Method with Non-Local Damage for the Simulation of Solids Subjected to Large Deformation and Damage</p> <p><i>Alban de Vaucorbeil*, Vinh Phu Nguyen</i></p>	<p>A Comparative Study of Different J2 Plasticity Models Using a Nonlocal Lattice Particle Method</p> <p><i>Changyu Meng*, Yongming Liu</i></p>	

## TS 3: MONDAY EVENING, JULY 26

4:00 PM	4:20 PM	4:40 PM	5:00 PM	5:20 PM
<b>#M408</b>	<b>Computational Mechanics for Performance and Damage of Materials, Chair(s): Timothy Truster</b>			
<p><b>Keynote presentation:</b> AI-Enhanced Automated Computational Framework for Modeling Materials with Complex Microstructures</p> <p><i>Soheil Soghrati*, Ming Yang, Hossein Ahmadian, Salil Pai, Mohamad Mohamadsalehi, Mingshi Ji, Balavignesh Vemparala</i></p>	<p>Residual Stress and Performance Predictions for Electron Beam Welds: Influence of Imbedded Multi-Physics and Material Calibrations on Outcomes</p> <p><i>Scott Smith*, Carl Herriott, Michael Stender</i></p>	<p>Experimental and Modeling Characterization of Amorphous/Crystalline Metal Composite Interface Mechanical Behavior by Nanoindentation</p> <p><i>Amir Abdelmawla*, Thanh Phan, Liming Xiong, Ashraf Bastawros</i></p>	<p>Bridging the Gap between Atomistic Simulations and Microscale Experiments in Understanding the Dislocation-Mediated Plastic Flow and its Interactions with the Interfaces in Amorphous/Crystalline Composites</p> <p><i>Thanh Phan*, Ashraf Bastawros, Liming Xiong</i></p>	
<b>#M409</b>	<b>Recent Advances in Computational Fracture Mechanics, Chair(s): Christian Linder</b>			
<p><b>Keynote presentation:</b> The Shifted Fracture Method</p> <p><i>Kangan Li, Nabil Atallah, Antonio Rodriguez-Ferran, Guglielmo Scovazzi*</i></p>	<p>A Hybrid Finite Element – Spectral Boundary Integral Method for 3D Dynamic Fracture Simulation</p> <p><i>David Kammer*, Gabriele Albertini, Ahmed Elbanna</i></p>	<p>High-Accuracy and High-Efficiency 3D Crack Propagation Analysis Based on S-Version Finite Element Strategy</p> <p><i>Naoki Morita*, Kouta Kishi, Naoto Mitsume, Kazuki Shibanuma</i></p>		
<b>#M413</b>	<b>Advances in High-Order Methods for Computational Fluid Dynamics, Chair(s): Chunlei Liang</b>			
<p><b>Keynote presentation:</b> Modeling Impact of Combined Statistical and Discretization Error for Ergodic Chaotic Systems</p> <p><i>Cory Frontin*, David Darmofal</i></p>	<p>An Efficient Preconditioner for a Monolithic High-Order Fluid-Structure Interaction Solver</p> <p><i>Matteo Franciolini*, Anirban Garai, Scott Murman</i></p>	<p>Non-Diffusive Volume Advection with A High Order Interface Reconstruction Method</p> <p><i>Jin Yao, Jerry Liu*</i></p>	<p>Construction of an Entropy Stable Discontinuous Galerkin Spectral Element Method for Two-Phase Flows Modeled by an Incompressible Navier-Stokes/Cahn-Hilliard System</p> <p><i>Juan Manzanero, David Kopriva*, Gonzalo Rubio, Esteban Ferrer, Eusebio Valero</i></p>	

## TS 3: MONDAY EVENING, JULY 26

4:00 PM	4:20 PM	4:40 PM	5:00 PM	5:20 PM
<b>#M414</b>	<b>Computational Methods for Modelling Stationary and Non-Stationary Interfaces at Multiple Scales, Chair(s): Lukasz Figiel</b>			
<p>A Diffused Interface Based Non-local Crystal Plasticity Model to Capture the Effect of Slip Transmission Across Grain Boundaries on Elasto-Plastic Response of Polycrystals</p> <p><i>Pritam Chakraborty*, Devesh Tiwari, Jothi Mani Thondiraj, Pierre-Antony Deschenes, Daniel Paquet</i></p>	<p>A Computational Analysis of the Plasticity-Assisted Ionic Transport from the Atomistic to the Microscale</p> <p><i>Liming Xiong*</i></p>	<p>Computational Modeling of Visco-Elasto-Capillary Phenomena of Soft Polymeric Solids</p> <p><i>Berkin Dortdivanlioglu*, Ali Javili</i></p>	<p>Finite-Deformation Sharp Interface Model for Void Evolution Under Irradiation</p> <p><i>Anter El-Azab, Sreekar Rayaprolu*, Kyle Starkey</i></p>	
<b>#M416</b>	<b>Materials Modeling Across Scales: From First Principles Calculations to Mesoscale Physics, Chair(s): Ananya Balakrishna</b>			
<p><b>Keynote presentation:</b> Accelerating Real-Space Electronic Structure Methods by Discontinuous Projection</p> <p><i>John Pask*</i></p>	<p>Configurational Forces in Density Functional Theory Calculations Using Orthogonalized Enriched Finite Elements</p> <p><i>Nelson David Rufus*, Vikram Gavini</i></p>	<p>DFT-FE --- a Massively Parallel Real-Space Density Functional Theory Code Using Adaptive Finite-Element Discretization, and its Application to Study Dislocation Core Energetics in Magnesium</p> <p><i>Sambit Das*, Phani Motamarri, Vikram Gavini</i></p>		
<b>#M418</b>	<b>Computational Methods In Environmental Fluid Mechanics, Chair(s): Clint Dawson</b>			
<p><b>Keynote presentation:</b> Particle-Based Free-Surface Flow Analysis with Bottom Boundary-Fitted Coordinate Transformation</p> <p><i>Naoto Mitsume*, Kyuya Matsumoto, Yusuke Imoto, Mitsuteru Asai</i></p>	<p>Fluid-Structure Interaction Using FEM Based on VOF and IGA Methods</p> <p><i>Yamato Yoshida*, Kazuo Kashiya, Hiroshi Hasebe</i></p>	<p>Noise Evaluation System Based on Fast Multipole Boundary Element Method and VR Technology</p> <p><i>Kazuo Kashiya*, Makoto Shoji, Kazushi Fukazawa, Hitoshi Yoshikawa</i></p>	<p>DG Methods for Layered Ocean Modeling: Thin Layers and Variable Bottom Topography</p> <p><i>Robert Higdon*</i></p>	

## TS 3: MONDAY EVENING, JULY 26

4:00 PM	4:20 PM	4:40 PM	5:00 PM	5:20 PM
<b>#M502</b>	<b>Optimization of Materials and Structures, Including Shape and Topology: Direct and Inverse Problems, Chair(s): Shelly Zhang</b>			
<p><b>Keynote presentation:</b> A Unified Approach for Topology Optimization with Local Stress Constraints Considering Various Failure Criteria: von Mises, Drucker-Prager, Tresca, Mohr-Coulomb, Bresler-Pister, and William-Warnke</p> <p><i>Oliver Giraldo-Londoño*, Glaucio H. Paulino</i></p>	<p>Integrated Shape and Topology Optimization of Compliant Mechanism with Stress Constraints Using Embedding Domain Discretization Method</p> <p><i>Chaitanya Dev*, Gabriel Stankiewicz, Paul Steinmann</i></p>	<p>Stress-Based Multi-Material Topology Optimization to Prevent Interface Fracture</p> <p><i>Daiki Watanabe*, Hiroya Hoshiba, Junji Kato</i></p>		
<b>#M509</b>	<b>Computational Fluid Mechanics with Free and Moving Boundaries: Methods and Applications, Chair(s): David Noble</b>			
<p><b>Keynote presentation:</b> A Scalable Adaptive Front-Tracking Method for Simulation of Multiphase Flow</p> <p><i>Ahmed Basil Kottilingal*, Stephane Zaleski</i></p>	<p>LVIRA+, an Extension of the Least Squares Volume-of-Fluid Interface Reconstruction Algorithm for Domains with Three and More Materials</p> <p><i>Eugene Kikinzon*, Portage Team</i></p>	<p>Novel Space-Time Finite Element Simulation Methods in Material Processes</p> <p><i>Marek Behr*</i></p>		
<b>#M513</b>	<b>Modeling and Simulation for Additive Manufacturing, Chair(s): Greg Wagner</b>			
<p><b>Keynote presentation:</b> Metal 3D Printing: Controlling Interdependent Meso-Nanosecond Dynamics and Defect Generation Using a Digital Twin</p> <p><i>Saad Khairallah*</i></p>	<p>Coupled Thermal-Fluid-Solid Simulations for High Fidelity Additive Manufacturing Predictions</p> <p><i>Michael Stender*, Lauren Beghini, Daniel Moser, Bradley Trembacki, Michael Veilleux, Kurtis Ford</i></p>	<p>Multiphysics Modeling of Melt-Pool Dynamics in Metal Additive Manufacturing: Integration of Thermofluidics, Mechanics and Microstructure Evolution</p> <p><i>Kunal Bhagat*, Kaila Bertsch, Dan Thoma, Shiva Rudraraju</i></p>		

### TS 3: MONDAY EVENING, JULY 26

4:00 PM	4:20 PM	4:40 PM	5:00 PM	5:20 PM
<b>#M614</b>	<b>Polygonal and Polyhedral Discretizations in Computational Mechanics, Chair(s): Joe Bishop</b>			
<p>Scaled Boundary Cubature Scheme for Numerical Integration over Planar Regions with Affine and Curved Boundaries</p> <p><i>Eric B. Chin*, N. Sukumar</i></p>	<p>Accurate Multi-Phase Flow Simulation in Faulted Reservoirs Using Mimetic Finite Difference Methods on Polyhedral Cells</p> <p><i>Rencheng Dong*, Faruk O. Alpak, Mary F. Wheeler</i></p>	<p>Unfitted Hybrid High-Order Methods for the Wave Equation</p> <p><i>Erik Burman, Omar Duran*, Alexandre Ern</i></p>	<p>A Discrete Exact Grad-Curl-Div Complex on Generic Polyhedral Meshes. Part 1: Algebraic Properties</p> <p><i>Daniele Di Pietro*, Jérôme Droniou</i></p>	<p>A Discrete Exact Grad-Curl-Div Complex on Generic Polyhedral Meshes. Part 2: Analytical Properties</p> <p><i>Daniele Antonio Di Pietro, Jerome Droniou*</i></p>
<b>#M617</b>	<b>Higher Order FE Methods for Challenging Problems in Science and Engineering, Chair(s): Jay Gopalakrishnan</b>			
<p><b>Keynote presentation:</b> Parallel Simulations of High-Power Optical Fiber Amplifiers</p> <p><i>Stefan Henneking*, Jacob Grosek, Leszek Demkowicz</i></p>	<p>A DPG-Based Time-Marching-Scheme for Linear Transient Problems</p> <p><i>Judit Muñoz-Matute*, David Pardo, Leszek Demkowicz</i></p>	<p>Conformings vs Weakly Conforming Comparison of the Double Adaptivity in Petrov Galerking Methods with Optimal Test Functions</p> <p><i>Jacob Salazar Solano*, Leszek Demkowicz</i></p>	<p>The DPG Method for Convection-Reaction Problems</p> <p><i>Leszek Demkowicz*, Nathan Roberts</i></p>	

# **Tuesday, July 27**

**All times listed are in Central Daylight Saving Time.**



## TS 4: TUESDAY MORNING, JULY 27

10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM
<b>#M103</b>	<b>Symposium Honoring J. Tinsley Oden's Monumental Contributions to Computational Mechanics, Chair(s): Romesh Batra</b>			
<p><b>Keynote presentation:</b> WATMUS: Wavelet Transformation Induced Multi-Time Scaling for Accelerating Fatigue and Multi-Physics Simulations</p> <p><i>Somnath Ghosh*</i></p>	<p>Physical Stability Analysis and Domain Decomposition Preconditioner for Dynamic Fracture Problems</p> <p><i>Lampros Svolos, Luc Berger-Vergiat, Haim Waisman*</i></p>	<p>Immersed Finite Elements Based on Local Cauchy Problems: Convergence and Stability</p> <p><i>Slimane Adjerid*, Tao Lin, Ruchi Guo</i></p>	<p>Computational Investigation of Interactions Between Test Articles and the Medium Weight Shock Test</p> <p><i>Matthew Lear, Jason Sammut*</i></p>	
<b>#M201</b>	<b>Imaging-Based Methods in Computational Medicine, Chair(s): Rafael Grytz</b>			
<p><b>Keynote presentation:</b> Physiology-Enhanced Data Analytics for a Personalized Approach to Disease Diagnosis and Management</p> <p><i>Giovanna Guidoboni*, Alon Harris, James Keller, Marjorie Skubic</i></p>	<p>Microstructural Finite Element Modeling of the Entire Lamina Cribrosa in the Human Optic Nerve Head</p> <p><i>Alireza Karimi*, Seyed Mohammadali Rahmati, Rafael Grytz, Christopher Girkin, J. Crawford Downs</i></p>	<p>Thermal Finite Element Analysis of an Intraocular Display Prosthesis for Corneal Blindness</p> <p><i>Dipika Gongal*, Siddhant Thakur, Ashaya Panse, John Stark, Charles Yu, Craig Foster</i></p>	<p>The Mechanical Loading of the Human Uterus and Cervix in Pregnancy Based on Ultrasound-Derived Finite Element Models</p> <p><i>Erin Louwagie*, Joy Vink, Helen Feltovich, Kristin Myers</i></p>	
<b>#M202</b>	<b>Quantification and Modeling of Spatially Heterogeneous Phenomena in Biological Materials, Chair(s): Manuel Rausch, Emma Lejeune, Mona Eskandari</b>			
<p>Mapping the Spatial Variation of Mitral Valve Elastic Properties Using Air-Pulse Optical Coherence Elastography</p> <p><i>Dragoslava P. Vekilov, Manmohan Singh, Salavat R. Aglyamov, Kirill V. Larin, K Jane Grande-Allen*</i></p>	<p>Uncovering Fetal Brain Folding Mechanisms via Medical Image Registration and Inverse Modeling</p> <p><i>Zhenlin Wang, Blake Martin, Yana Blinkouskaya, Krishna Garikipati, Johannes Weickenmeier*</i></p>	<p>Insights from In-Silico Models of Atherosclerosis and the Role of Leukocytes and Biomechanics</p> <p><i>Heather Hayenga*, Rita Bhui, John Yoo, Jeremy Warren, Maziyar Keshavarzian, Clark Meyer</i></p>	<p>Spatial White Matter Stiffness Variations in the Mouse Brain</p> <p><i>Xuesong Zhang*, Johannes Weickenmeier</i></p>	
<b>#M206</b>	<b>Multiphysics and Data-Driven Modeling for Cardiovascular Biomedicine, Chair(s): Debanjan Mukherjee</b>			
<p><b>Keynote presentation:</b> Multiscale Computational Hemodynamic Predictions in the Pulmonary Vasculature</p> <p><i>Mette S Olufsen*, Michelle Bartolo, Naomi Chesler</i></p>	<p>The Coupled Momentum Method Revisited: Formulation, Higher-Order Elements, Solver Technology, and Verification</p> <p><i>Ingrid Lan*, Ju Liu, Weiguang Yang, Alison Marsden</i></p>	<p>Using Multiscale Data-Driven Modeling to Characterize Sex Differences in Drug Development</p> <p><i>Mathias Peirlinck*, Francisco Sahli Costabal, Ellen Kuhl</i></p>	<p>Reduced-Order Modeling of the Circulation During Cardiovascular Stress</p> <p><i>Joseph Muskat*, Vitaliy Rayz, Craig Goergen, Charles Babbs</i></p>	

## TS 4: TUESDAY MORNING, JULY 27

10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM
<b>#M301</b>	<b>Advances and Applications of Mechanistic Machine Learning, Reduced-Order and Data-Driven Analyses, Chair(s): CT Wu, Rudy Geelen</b>			
<p><b>Keynote presentation:</b> Microstructure-guided Deep Material Network for Nonlinear Material Modeling</p> <p><i>Tianyu Huang, Zeliang Liu, Wei Chen*</i></p>	<p>System Identification in Digital Twins of Human Musculo-Skeletal Systems</p> <p><i>Karan Taneja*, Xiaolong He, J.S. Chen</i></p>	<p>High-Quality Material Data Acquisition for Data-Driven Computing Using Manifold Learning-Based Data-Driven Identification Approach</p> <p><i>Tung-Huan Su*, Jimmy Jean, Chuin-Shan Chen</i></p>	<p>Data-Driven Constitutive Laws: Three Dimensional Homogenization for Finite-Strain Hyperelasticity</p> <p><i>Jan Niklas Fuhg*, Michele Marino, Nikolaos Bouklas</i></p>	
<b>#M307</b>	<b>Data-Enhanced Modeling and Uncertainty Quantification of Systems with Multiple Fidelities, Chair(s): Alex Gorodetsky</b>			
<p>Global Sensitivity Analysis via Hybrid MLMC PCE</p> <p><i>Michael Merritt*, Gianluca Geraci, Michael Eldred, Teresa Portone</i></p>	<p>Uncertainty Quantification of Delamination Failure within Composite Structures Using a Submodel Based Multi-Fidelity Approach</p> <p><i>Alexander Hanson*</i></p>	<p>Multi-fidelity Methods for Uncertainty Quantification of Nonlocal Diffusion Model</p> <p><i>Parisa Khodabakhshi*, Max Gunzburger, Karen Willcox</i></p>	<p>Low-Dimensional Mapping Strategies for Enhancing Multifidelity Uncertainty Quantification of Cardiovascular Models</p> <p><i>Casey Fleeter*, Gianluca Geraci, Daniele Schiavazzi, Andrew Kahn, Alison Marsden</i></p>	<p>Uncertainty Quantification for Random Field Quantities Using Multifidelity Karhunen-Loeve Expansions</p> <p><i>Aniket Jivani*, Xun Huan, Cosmin Safta, Beckett Y. Zhou, Nicolas R. Gauger</i></p>
<b>#M308</b>	<b>Physics-Informed Learning and Data-Enabled Predictive Modeling and Discovery of Complex Systems, Chair(s): Danial Faghihi and Kathryn Maupin</b>			
<p>Applied Machine Learning Method to Predict Crack Propagation Path in Polycrystalline Graphene Sheet</p> <p><i>Mohan Surya Raja Elapolu*, Alireza Tabarraei, MD Imrul Reza Shishir</i></p>	<p>Scale-Sensitivite Homogenization Utilizing Deep Neural Networks</p> <p><i>Aaron Allred*</i></p>	<p>Accounting for Model Errors in Probabilistic Linear Identification of Nonlinear PDE Systems</p> <p><i>Nicholas Galioto*, Alex Gorodetsky</i></p>		

## TS 4: TUESDAY MORNING, JULY 27

10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM
<b>#M309</b>	<b>Data-Driven Science with Uncertainty Quantification, Machine Learning, and Optimization, Chair(s): Miguel Bessa, Florent Pled</b>			
<p>On the Solution of Statistical Inverse Problems Using Machine Learning Methods Based on Artificial Neural Networks</p> <p><i>Florent Pled*, Christophe Desceliers</i></p>	<p>Uncertainty Quantification in the Vibration Analysis of a Spent Nuclear Fuel Container with High Modal Density</p> <p><i>Olivier Ezvan*, Xiaoshu Zeng, Roger Ghanem, Bora Gencturk</i></p>	<p>Discovery of Deformation Mechanisms and Constitutive Response of Soft Material Surrogates of Biological Tissue by Data-Driven Variational System Identification</p> <p><i>Zhenlin Wang, Jon Estrada, Ellen Arruda, Krishna Garikipati, Siddhartha Srivastava*</i></p>	<p>Variational Bayesian Inference for Convolutional Neural Networks in Precision Health Balance Training</p> <p><i>Jeremiah Hauth*, Steven Teguhlaksana, Jamie Ferris, Kathleen Sienko, Xun Huan</i></p>	<p>Causal Random Computational Nonlinear Dynamical Model in the Framework of Viscoelasticity in Finite Displacement with Modeling Uncertainties</p> <p><i>Ibrahim Benslim*, Mohamed Guerich, Evangeline Capiez-Lernout, Christophe Desceliers</i></p>
<b>#M311</b>	<b>Model Order Reduction for Physical Simulations, Chair(s): Masayuki Yano</b>			
<p>Multidimensional Galerkin-POD for Uncertainty Quantification of PDE Solutions with Random Parameters</p> <p><i>Peter Benner, Jan Heiland*</i></p>	<p>Reduced-Order Modeling of Parametric Simulations with Bayesian Matrix Completion</p> <p><i>Saibal De*, Hadi Salehi, Alex Gorodetsky</i></p>	<p>A Globally Convergent Method to Accelerate PDE-Constrained Optimization Using On-the-fly Model Hyperreduction</p> <p><i>Tianshu Wen*, Matthew Zahr</i></p>		
<b>#M314</b>	<b>Data-Driven Modeling in Mechanics, Chair(s): Laura De Lorenzis</b>			
<p><b>Keynote presentation:</b> Robust Modal Decomposition of Corrupt Fluid Flows</p> <p><i>Isabel Scherl*, Benjamin Strom, Jessica Shang, Owen Williams, Brian Polagye, Steven Brunton</i></p>	<p>Deep Learning-Based Reduced Order Modeling with Application to Prediction of Riverine Flow Velocity</p> <p><i>Mojtaba Forghani*, Yizhou Qian, Jonghyun Lee, Matthew Farthing, Tyler Hesser, Peter Kitanidis, Eric Darve</i></p>	<p>Data-Driven Nonlinear Aeroelastic Models of Morphing Wings for Control</p> <p><i>Urban Fasel*, Nicola Fonzi, Steven L. Brunton</i></p>	<p>Orbital Dynamics of Binary Black Hole Systems can be Learned from Gravitational Wave Measurements</p> <p><i>Brendan Keith*, Akshay Khadse, Scott Field</i></p>	
<b>#M325</b>	<b>Machine Learning for Solving Inverse Problems in Computational Mechanics and Materials, Chair(s): Jiaxin Zhang</b>			
<p><b>Keynote presentation:</b> Solving Stochastic Inverse Problems for Property-Structure Relationship in Computational Materials Science</p> <p><i>Anh Tran, Tim Wildey*</i></p>	<p>Data Driven Modeling of Interfacial Traction Separation Relations Using a Thermodynamically Consistent Neural Network</p> <p><i>Congjie Wei*, Jiaxin Zhang, Kenneth Liechti, Chenglin Wu</i></p>	<p>Crack Estimation in Miter Gates Using A Machine Learning-Based Global-Local Modeling Method</p> <p><i>Zihan Wu*, Travis Fillmore, Manuel Vega, Zhen Hu, Michael Todd</i></p>	<p>Machine Learning Model Development for Additive Manufacturing Process Parameter Optimization</p> <p><i>Berkcan Kapusuzoglu*, Paromita Nath, Matthew Sato, Sankaran Mahadevan, Paul Witherell</i></p>	

## TS 4: TUESDAY MORNING, JULY 27

10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM
<b>#M401</b>	<b>Peridynamics and Its Applications, Chair(s): Erdogan Madenci</b>			
A Novel Surface Correction Technique for State-Based Peridynamics  <i>Lei Wang*, Quan Gu</i>	Accurate Artificial Boundary Conditions for the Semi-Discretized One-Dimensional Peridynamics  <i>Gang Pang*, Songsong Ji, Jiwei Zhang</i>	A Peridynamics Model for Brittle Damage in Solids under Thermomechanical Loading  <i>Anil Pathrikar*, Debasish Roy</i>	Combining Peridynamics and Digital Image Correlation Algorithms for Challenging Strain Calculations  <i>Tomas Vaitkunas*, Paulius Griškevičius, Darius Eidukynas, Valdas Grigaliunas, Adi Adumitroaie</i>	Dual Horizon Peridynamic Formulation for Thermal Diffusion Analysis  <i>Selda Oterkus*, Bingquan Wang, Erkan Oterkus</i>
<b>#M402</b>	<b>Computational Geomechanics, Chair(s): Qiushi Chen</b>			
Machine Learning-Enabled Discrete Element Method for Contact Detection and Resolution of Irregular-Shaped Particles  <i>Zhengshou Lai*, Qiushi Chen, Linchong Huang</i>	MPI-Accelerated Level Set-Discrete Element Method Using Binning Algorithm  <i>Peng Tan*, Nicholas Sitar</i>	Modeling Continuous Sea Ice Floes with the Discrete Element Method  <i>Devin O'Connor*, Brendan West</i>	A Generalized Image Preprocessing Workflow for High Fidelity 3D Rendering of Natural Sands from X-Ray Computed Tomography Images  <i>Peng Tan, Hasitha Sithadara Wijesuriya*, Nicholas Sitar</i>	Modeling Loading and Fragmentation in Compacted Granular Systems  <i>Joel Clemmer*, Dan Bolintineanu, Jeremy Lechman</i>
<b>#M403</b>	<b>Computational Fluid Dynamics (CFD) and Fluid-Structure Interaction (FSI): Algorithms and Applications, Chair(s): David Kamensky</b>			
<b>Keynote presentation:</b> Scale Resolving Simulations of a Bump with Strong Favorable and Adverse Pressure Gradients  <i>Kenneth Jansen*, Riccardo Balin, James Wright, John Evans</i>	Dynamically and Geometrically Conservative Fully-Discrete Stabilized Finite Element Methods for Conservation Laws on Moving Domains with Controllable Numerical Dissipation  <i>DeAnna Gilchrist*, John Evans</i>	Variational Multiscale Large Eddy Simulations for Very High Rayleigh Number Rayleigh-Benard Convection  <i>David Sondak*, Thomas Smith, Roger Pawlowski, Sidafa Conde, John Shadid</i>	Finite Element Based Stabilized Formulation for Hypersonic Flows  <i>David Codoni, Artem Korobenko*</i>	
<b>#M405</b>	<b>Peridynamic Theory and Multiscale Methods for Complex Material Behavior, Chair(s): Pablo Seleson</b>			
Strength-Induced Hybrid Local/Nonlocal Continuum Mechanics Modeling of Fractures in Brittle Materials  <i>Fei Han*, Gilles Lubineau</i>	Parallelization of a Stabilized Peridynamics Code Coupled with Finite Element Method Using OpenMP  <i>Suyeong Jin*, Young Kwang Hwang, Jung-Wuk Hong</i>	Simulation of Multi-Physics Phenomena with a Hybrid FEM-Peridynamic Approach  <i>Mirco Zaccariotto*, Tao Ni, Federico Moro, Francesco Pesavento, Bernhard A. Schrefler, Ugo Galvanetto</i>	A Peridynamic Diffusion Model for Unbounded Problems  <i>Alexander Hermann*, Arman Shojaei, Pablo Seleson, Christian. J Cyron</i>	Wave Propagation in Peridynamics  <i>Giuseppe Fanizza*</i>

## TS 4: TUESDAY MORNING, JULY 27

10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM
<b>#M406</b>	<b>Recent Advances and Applications in Meshfree and Particle Methods, Chair(s): John T. Foster</b>			
Multi-Phase MPM Approaches for Unsaturated Soils  <i>Alba Yerro*, Veronica Girardi, Francesca Ceccato</i>	MPM Modeling of Large Deformations and Soil-Structure Interaction in Geotechnical In-Situ Testing  <i>Luis Zambrano-Cruzatty*, Kaleigh Yost, Alba Yerro</i>	A High-Order Material Point Methods for Structured and Unstructured (Triangular) Grids  <i>Roel Tielen*, Matthias Möller, Kees Vuik</i>	A Cell-Based Interpolation Scheme to Mitigate Cell-Crossing Errors in the Material Point Method  <i>Wen-Chia Yang*</i>	Time Integration Advances and Challenges in the Material Point Method.  <i>Martin Berzins*</i>
<b>#M408</b>	<b>Computational Mechanics for Performance and Damage of Materials, Chair(s): Pinlei Chen</b>			
<b>Keynote presentation:</b> Prediction of Residual Stress States Using an Eulerian Plasticity Model  <i>Martin Kroon*, Miles Rubin, Per Lindström</i>	A Space-Time Gauge Theory Based on Translational Symmetry for Modelling Viscoplasticity in Polycrystalline Solids  <i>Sanjeev Kumar*</i>	SCA - Applications to Multiscale Modeling for Self-Piercing Riveting Process  <i>Derick Suarez*, Sourav Saha, Wing Kam Liu</i>		
<b>#M409</b>	<b>Recent Advances in Computational Fracture Mechanics, Chair(s): N. Sukumar</b>			
A Numerical Method for the Growth of Multiple Fractures in Two Dimensions  <i>Adrian Lew*, Benjamin Grossman-Ponemon</i>	Accurate Crack Path Prediction in Mixed-Mode Cohesive Fracture Using Virtual Element Method  <i>Habeun Choi*, Heng Chi, Kyoungsoo Park</i>	Evaluation of Crack Propagation Analysis by Local Approach under Ultra Low Cycle Fatigue  <i>Yoshitaka Wada*, Kaito Ueda</i>	A Multi-Resolution Approach to Hydraulic Fracture Simulations  <i>Andre Costa*, John Dolbow, Randall Settigast, Tao Jin, Matteo Cusini</i>	
<b>#M413</b>	<b>Advances in High-Order Methods for Computational Fluid Dynamics, Chair(s): Ngoc-Cuong Nguyen</b>			
Extension of the Spectral Difference Method Using Raviart-Thomas Elements to the Sixth-Order of Accuracy on Triangles and Formulation on Tetrahedra  <i>Adèle Veilleux*, Guillaume Puigt, Hugues Deniau, Guillaume Daviller</i>	A High-Order Spectral Difference Solver for 2D Ideal MHD Equations with Constrained Transport  <i>Kuangxu Chen*, Chunlei Liang</i>	DG Discretizations of the INS Equations, Which Features Matter the most?  <i>Lorenzo Botti, Francesco Carlo Massa*</i>	High-Order HDG Formulations for Compressible, Incompressible and Weakly Compressible Flows  <i>Antonio Huerta*, Matteo Giacomini</i>	High-Order Space-Time Flux Reconstruction Methods for Moving Domain Simulation  <i>Meilin Yu*</i>

## TS 4: TUESDAY MORNING, JULY 27

10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM
<b>#M416</b>	<b>Materials Modeling Across Scales: From First Principles Calculations to Mesoscale Physics, Chair(s): Ananya Balakrishna</b>			
Real Space Density Functional Theory Method for Twisted Structures  <i>Hsuan Ming Yu*, Amartya Banerjee</i>	Large-Scale Ab-Initio Polarizability Calculations Using Real-Space Finite-Element Based Methods  <i>Phani Motamarri*, Krishnendu Ghosh, Vikram Gavini</i>	Real-Space Density Functional Theory Adapted to Cyclic and Helical Symmetry  <i>Abhiraj Sharma*, Phanish Suryanarayana</i>	Calculation of Spin Hamiltonian Parameters Using Real-Space Density Functional Theory  <i>Krishnendu Ghosh*, He Ma, Mykyta Onizhuk, Vikram Gavini, Giulia Galli</i>	
<b>#M418</b>	<b>Computational Methods In Environmental Fluid Mechanics, Chair(s): Eirik Valseth</b>			
<b>Keynote presentation:</b> On Coupling Hydrologic and Surge Processes in Coastal Watersheds  <i>Matthew Bilskie*, Haihong Zhao, Don Resio, John Atkinson, Zachary Cobell, Scott Hagen</i>	Subgrid Corrections in Finite-Element Models of Storm-Driven Coastal Flooding  <i>Johnathan Woodruff*, Casey Dietrich, Damrongsak Wirasaet, Andrew Kennedy, Diogo Bolster, Zachariah Silver, Sheppard Medlin, Randall Kolar</i>	Subgrid Surface Connectivity for Shallow Water Equations  <i>Amirhiseub Begmohammadi*, Damrongsak Wirasaet, Diogo Bolster, Andrew Kennedy, Joel Dietrich</i>	Validating Sub-Grid Scale Approaches for Modeling of Cross-Barrier Flows in Flood Control Systems for Hydrodynamic Storm Hazard Models  <i>Dylan Wood*, Collin Lester, Ethan Kubatko, Mehrzad Rahimi, Abdollah Shafieezadeh</i>	
<b>#M502</b>	<b>Optimization of Materials and Structures, Including Shape and Topology: Direct and Inverse Problems, Chair(s): Miguel Alejandro Aguilo</b>			
A New Regularization Approach for Topology Optimization with Discrete Objects  <i>Julia Carroll*, James Guest</i>	Topology Optimization with Geometric Templates  <i>Tareq Zobaer*, Alok Sutradhar</i>	Application of Complex-Step Approximation to System Reliability-based Design Optimization  <i>Junho Chun*</i>		
<b>#M509</b>	<b>Computational Fluid Mechanics with Free and Moving Boundaries: Methods and Applications, Chair(s): Patrick Anderson</b>			
Scientific Modeling of Aerosol Jet Deposition  <i>Robert Secor*, Ethan Secor</i>	Combined Modeling and Experimental Study to Explain Air Trap During Droplet Impact onto Dielectric Surface  <i>Subhayan Halder*, Vitaliy Yurkiv, Rafael Granda Neto, Abhilash Sankaran, Jingwei Wu, Alexander Yarin, Farzad Mashayek</i>	Free Surface Instabilities During Horizontal Ribbon Growth Solidification Process  <i>Alireza Pirnia*, Brian Helenbrook</i>	Process Model for Multilayer Slide Coating of Polymer Electrolyte Membrane Fuel Cells  <i>Kristianto Tjiptowidjojo*, P. Randall Schunk</i>	Multi-Physics Modeling of Electrochemical Deposition  <i>Justin Kauffman*, John Gilbert, Eric Paterson</i>

## TS 4: TUESDAY MORNING, JULY 27

10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM
<b>#M513</b>	<b>Modeling and Simulation for Additive Manufacturing, Chair(s): A. To</b>			
<p><b>Keynote presentation:</b> Supporting the Metal Additive Manufacturing Simulation Community Through Validation Measurements</p> <p><i>Lyle Levine*, Brandon Lane, Thien Phan, Fan Zhang, Mark Stoudt, Brian Simonds, David Deisenroth</i></p>	<p>Experimental-Numerical Analysis of Microstructure-Property Linkages for Additively Manufactured Materials</p> <p><i>Alexander Raßloff*, Paul Schulz, Robert Kühne, André Till Zeuner, Marreddy Ambati, Ilja Koch, Maik Gude, Martina Zimmermann, Markus Kästner</i></p>	<p>A Constitutive Structural Parameter for the Work Hardening Behavior of Additively Manufactured Ti-6Al-4V</p> <p><i>Alan Jankowski*</i></p>	<p>ICME-Based Modeling and Qualification for Additive Manufacturing of Ni-Based Superalloys</p> <p><i>Qiaofu Zhang*, Abhinav Saboo, Sam Sorkin, Jiadong Gong, Greg Olson</i></p>	
<b>#M614</b>	<b>Polygonal and Polyhedral Discretizations in Computational Mechanics, Chair(s): Gianmarco Manzini</b>			
<p>Polyhedral Nonconforming Discretization Methods for Multiple-Network Poroelasticity</p> <p><i>Michele Botti*, Paola F. Antonietti, Lorenzo Botti, Daniele A. Di Pietro</i></p>	<p>A Posteriori Error Estimation via Equilibrated Stress Reconstruction for Unilateral Contact Problems</p> <p><i>Ilaria Fontana*, Daniele Di Pietro, Kyrylo Kazymyrenko</i></p>	<p>Adaptive Virtual Element Methods for Simulations of Flow in Fractured Media</p> <p><i>Andrea Borio*, Stefano Scialò, Fabio Vicini, Stefano Berrone, Alessandro D'Auria</i></p>	<p>Refinement of Polygonal Grids Using Convolutional Neural Networks with Applications to Polygonal Discontinuous Galerkin and Virtual Element Methods</p> <p><i>Enrico Manuzzi*, Paola Francesca Antonietti</i></p>	<p>Some Numerical Aspects of the Virtual Element Method Applied to the Stokes Problem</p> <p><i>Annamaria Mazzia*, Gianmarco Manzini</i></p>
<b>#M617</b>	<b>Higher Order FE Methods for Challenging Problems in Science and Engineering, Chair(s): Stefan Henneking</b>			
<p>Isogeometric Residual Minimization Method for Time-Dependent Maxwell Problem</p> <p><i>Maciej Paszynski*, Marcin Los, Luis Garcia-Castillo</i></p>	<p>Convolution Finite Element Method</p> <p><i>Amirhossein Amiri-Hezaveh*, Arif Masud, Martin Ostoja-Starzewski</i></p>	<p>High Order Multiscale Finite Element Method for Thermoelasticity Problems</p> <p><i>Marek Klimczak*, Witold Cecot</i></p>	<p>Multiscale FEM for Statics and Eigenvibration Analysis</p> <p><i>Witold Cecot*, Marta Oleksy</i></p>	<p>Active-Set Solution of Mortar Contact Between Higher-Order Elements in Explicit Dynamics</p> <p><i>Stephen Beissel*</i></p>

## TS 5: TUESDAY AFTERNOON, JULY 27

2:00 PM	2:20 PM	2:40 PM	3:00 PM	3:20 PM
<b>#M103</b>	<b>Symposium Honoring J. Tinsley Oden's Monumental Contributions to Computational Mechanics, Chair(s): Maryam Shakiba</b>			
<p>Poro-Hyperelastic Shear</p> <p><i>Patrick Selvadurai*, Alexander Suvorov</i></p>	<p>Perspectives in Peridynamics: Mathematical Constructs and Computations</p> <p><i>Florin Bobaru*</i></p>	<p>3-D Modeling of Multi-Stage Hydraulic Fracturing from a Borehole within a GFEM Framework</p> <p><i>Nathan Shauer, Armando Duarte*</i></p>	<p>Elastodynamics of Sandwich Beams Using a Mixed Layer-Wise Formulation and Least-Squares Space-Time Finite Element Method</p> <p><i>Devin Burns*, Romesh Batra</i></p>	
<b>#M201</b>	<b>Imaging-Based Methods in Computational Medicine, Chair(s): Johannes Weickenmeier</b>			
<p><b>Keynote presentation:</b> Time-Lapse In Vivo Imaging of Bone Formation and Resorption in Mouse Models and Humans Using Microcomputed Tomography and High-Resolution Peripheral Quantitative Computed Tomography</p> <p><i>Seyedmahdi Hosseinitabatabaei, Isabela Vitiene, Maximillian Rummler, Annette Birkhold, Bettina Willie*</i></p>	<p>2D to 3D Volumetric Reconstruction of Human Spine for Diagnosis and Prognosis of Spinal Deformities</p> <p><i>Mahsa Tajdari*, Farzam Tajdari, Aishwarya Pawar, Jessica Zhang, Wing Kam Liu</i></p>	<p>In Silico Experiments of Bone Remodeling Towards Predicting Drug Treatment of Bone Diseases</p> <p><i>Yoshitaka Kameo*, Yuki Miya, Taiji Adachi</i></p>	<p>Diffusion-Tensor Informed Finite Element Analysis of Shear Wave Propagation in Muscle Architecture</p> <p><i>Joseph Crutison*, Thomas Royston</i></p>	
<b>#M202</b>	<b>Quantification and Modeling of Spatially Heterogeneous Phenomena in Biological Materials, Chair(s): Manuel Rausch, Emma Lejeune, Johannes Weickenmeier</b>			
<p><b>Keynote presentation:</b> A Nonlinear Fibrous Viscoelastic Model Describes the Experimental Tensile Behavior of Human Cervix</p> <p><i>Lei Shi, Joy Vink, Ronald Wapner, Kristin Myers*</i></p>	<p>The Spatial and Temporal Heterogeneity of Lung Specimens</p> <p><i>Crystal Mariano, Samaneh Sattari, Mohammad Maghsoudi-Ganjeh, Mona Eskandari*</i></p>	<p>Localized Viscoelastic Behavior of the Porcine Urinary Bladder</p> <p><i>Tyler Tuttle, Sara Roccabianca*</i></p>	<p>Evaluating Vaginal Creep Using Extension-Inflation Testing</p> <p><i>Gabrielle Clark-Patterson*, Raffaella De Vita, Kristin Miller</i></p>	
<b>#M206</b>	<b>Multiphysics and Data-Driven Modeling for Cardiovascular Biomedicine, Chair(s): Ming-Chen Hsu</b>			
<p>An Immersed Domain Formulation for Fluid-Structure Interaction with Contact</p> <p><i>Patrick Zulian*, Maria Nestolka, Lisa Gaedke-Merzhaüser, Rolf Krause</i></p>	<p>Fully Coupled Dynamic Simulations of Bioprosthetic Aortic Valves based on an Embedded Strategy for Fluid-Structure Interaction</p> <p><i>Maria Giuseppina Chiara Nestola*, Barna Becsek, Pascal Corso, Patrick Zulian, Dominik Obrist, Rolf Krause</i></p>	<p>Isogeometric Finite Element-Based Simulation of the Aortic Heart Valve: Integration of Neural Network Structural Material Model and Structural Tensor Fiber Architecture Representations</p> <p><i>Wenbo Zhang, Michael Sacks, Tan Bui, Shruti Motiwale*</i></p>		



## TS 5: TUESDAY AFTERNOON, JULY 27

2:00 PM	2:20 PM	2:40 PM	3:00 PM	3:20 PM
<b>#M301</b>	<b>Advances and Applications of Mechanistic Machine Learning, Reduced-Order and Data-Driven Analyses, Chair(s): Susanta Ghosh, Upendra Yadav</b>			
<p>Microstructure-Based High Cycle Fatigue Life Prediction Based on A Data-Driven Computational Approach</p> <p><i>Dong Qian*, Rui Zhang, Yingjian Liu, Derick Suarez, Sourav Saha, Wing Kam Liu</i></p>	<p>A Physics-Constrained Machine Learning Approach to Solving Heat Transfer Equations on Chip</p> <p><i>Haiyang He*, Jay Pathak, Norman Chang, Rishikesh Ranade, Amir Maleki, Priya Kasimbeg, Stephen Pan, Jimin Wen, David Geb</i></p>	<p>Efficient Hyper-Reduced Order Model for Additive Manufacturing Thermal Fluid Analysis</p> <p><i>Ye Lu*, Kevontrez Jones, Zhengtao Gan, Wing Liu</i></p>	<p>Combinatorial Optimal Control of PDEs with Deep Reinforcement Learning</p> <p><i>Gradey Wang*, Adrian Lew, Eric Darve</i></p>	<p>Linking the Process-Structure-Property Relationship for Additively Manufactured Materials Using Mechanistic Data Science Framework</p> <p><i>Satyajit Mojumder*, Zhengtao Gan, Wing Kam Liu</i></p>
<b>#M309</b>	<b>Data-Driven Science with Uncertainty Quantification, Machine Learning, and Optimization, Chair(s): Krishna Garikipati, Jim Stewart</b>			
<p><b>Keynote presentation:</b> Bayesian Neural Networks for Weak Solution of PDEs with Uncertainty Quantification</p> <p><i>Xiaoxuan Zhang*, Krishna Garikipati</i></p>	<p>Greedy Multiscale Strategies for Sparse Modeling and Emulation Tasks</p> <p><i>Prashant Shekhar*, Abani Patra</i></p>	<p>Physics-Informed Discretization-Based Learning: a Unified Framework for Solving PDE-Constrained Forward and Inverse Problems</p> <p><i>Jian-xun Wang*, Han Gao, Luning Sun</i></p>	<p>A Hierarchical Bayesian Approach to Regularization with Application to the Inference of Relaxation Spectra</p> <p><i>Sayali Kedari*, Gowtham Atluri, Kumar Vemaganti</i></p>	
<b>#M311</b>	<b>Model Order Reduction for Physical Simulations, Chair(s): Youngsoo Choi</b>			
<p>Non-Intrusive Reduced Order Modeling of Poroelasticity of Heterogeneous Media Based on a Discontinuous Galerkin Approximation</p> <p><i>T. Kadeethum*, F. Ballarin, N. Bouklas</i></p>	<p>Neural Autoencoders for Discretization-Independent Modeling of Continuous Fields</p> <p><i>James Duvall*, Shaowu Pan, Karthik Duraisamy</i></p>	<p>Projection onto a Quadratic Manifold for Mitigating the Kolmogorov Barrier in Model Reduction</p> <p><i>Joshua Barnett*, Charbel Farhat</i></p>	<p>Model Reduction of Convection-Dominated Partial Differential Equations via Optimization-Based Implicit Feature Tracking</p> <p><i>Matthew Zahr*, Marzieh Mirhoseini</i></p>	
<b>#M325</b>	<b>Machine Learning for Solving Inverse Problems in Computational Mechanics and Materials, Chair(s): Tim Wildey</b>			
<p><b>Keynote presentation:</b> Efficient Inverse Problem Learning with Precise Localization and Exploratory Sampling</p> <p><i>Jiaxin Zhang*, Victor Fung</i></p>	<p>Bayesian Optimization of Spatial Phase Modulation for Programmable Localization in Plasmonic Metasurface</p> <p><i>Doksoo Lee*, Shizhou Jiang, Oluwaseyi Balogun, Wei Chen</i></p>	<p>Optimization of Chiral Metamaterials via Deep Neural Networks</p> <p><i>Yun-Che Wang*, Chun-Wei Liu, Tsai-Wen Ko</i></p>	<p>A Hybrid Black-Box Optimization for Efficient Calibration of Heat Conduction Model in Additive Manufacturing</p> <p><i>Sirui Bi*, Benjamin Stump, Jiaxin Zhang, Yousub Lee, Matt Bement, Guannan Zhang</i></p>	

## TS 5: TUESDAY AFTERNOON, JULY 27

2:00 PM	2:20 PM	2:40 PM	3:00 PM	3:20 PM
<b>#M401</b>	<b>Peridynamics and Its Applications, Chair(s): Selda Oterkus</b>			
<p>A Surface Correction Technique for Bond Based Peridynamics</p> <p><i>Semsi Coskun*, Jinseok Kim</i></p>	<p>Imposing Local Boundary Conditions for Peridynamics Equation of Motion in Arbitrary Domains by a Generalized Fictitious Nodes Method</p> <p><i>Farzaneh Mousavi*, Jiangming Zhao, Siavash Jafarzadeh, Florin Bobaru</i></p>	<p>A Fast Convolution-Based Method for Peridynamic Models of Elasticity and Fracture</p> <p><i>Siavash Jafarzadeh*, Farzaneh Mousavi, Longzhen Wang, Adam Larios, Florin Bobaru</i></p>		
<b>#M402</b>	<b>Computational Geomechanics, Chair(s): Waiching (Steve) Sun</b>			
<p>Coupling Methods for Multiphysics Modelling of Enhanced Geothermal Systems</p> <p><i>Bruce Gee*, Robert Gracie</i></p>	<p>Simulation of Injection-Induced Seismicity Using Hybrid Finite Element-Spectral Boundary Integral Scheme</p> <p><i>Md Shumon Mia*, Mohamed Abdelmeguid, Ahmed Elbanna</i></p>	<p>A Fiber-Reinforced Constitutive Model for Earthen Structural Materials</p> <p><i>Persid Koci*, Craig Foster</i></p>	<p>Recent Advances in Modeling Interfaces and Viscoelastic Flow Properties with Particles in Geodynamic Computations</p> <p><i>Elbridge Gerry Puckett, Mack Gregory*</i></p>	
<b>#M403</b>	<b>Computational Fluid Dynamics (CFD) and Fluid-Structure Interaction (FSI): Algorithms and Applications, Chair(s): Jinhui Yan</b>			
<p>Physics-informed Model-Based Deep Reinforcement Learning for Dynamic Control</p> <p><i>Xinyang Liu*, Jian-xun Wang</i></p>	<p>A Spatially Varying Robin Interface Condition for Fluid-Structure Coupled Simulations</p> <p><i>Shunxiang Cao*, Guangyao Wang, Alex Main, Kevin Wang</i></p>	<p>Towards a Generalized Engineering Theory for Hydrodynamic Slamming Emanating from Partitioned Fluid-Structure Interaction Analysis</p> <p><i>Wensi Wu*, Christopher Earls</i></p>	<p>Industrial Scale Simulations Using Immersogeometric Analysis on Octree Meshes</p> <p><i>Kumar Saurabh*, Boshun Gao, Masado Ishii, Milinda Fernando, Makrand Khanwale, Biswajit Khara, Sudeep Menon, Ming-Chen Hsu, Adarsh Krishnamurthy, Hari Sundar, Baskar Ganapathysubramanian</i></p>	<p>Construction of a Nonlocal Model for Incompressible Flow at Low Reynolds Numbers</p> <p><i>Jiangming Zhao*, Florin Bobaru</i></p>

## TS 5: TUESDAY AFTERNOON, JULY 27

2:00 PM	2:20 PM	2:40 PM	3:00 PM	3:20 PM
<b>#M406</b>	<b>Recent Advances and Applications in Meshfree and Particle Methods, Chair(s): Mike Hillman</b>			
Multi-GPU MPM for Memory Intensive Engineering Projects  <i>Justin Bonus*, Pedro Arduino, Michael Motley, Marc Eberhard</i>	Recent Advances in Image-Based Modeling and Evaluation of Fiber Reinforced Composite Responses to Impact Loading with Integrated Mesh-Based and Particle Methods*  <i>Zhen Chen*, A.M. Rajendran, Robert Moser</i>	Stable Midpoint Integration Method for Galerkin Meshfree Method  <i>Mohammed Mujtaba Atif*, Sheng-Wei Chi</i>		
<b>#M408</b>	<b>Computational Mechanics for Performance and Damage of Materials, Chair(s): Pinlei Chen</b>			
Modeling the Behavior of PC/ABS Ternary Blends  <i>A. Francisca Carvalho Alves*, Bernardo P. Ferreira, Francisco M. Andrade Pires</i>	A Quasicontinuum Approach for Modeling Fracture and Damage in Polymer Networks: Role of Viscoelastic Properties and Rate Dependent Failure  <i>Ahmed Ghareeb*, Ahmed Elbanna</i>	Viscoelastic Finite Element Study of Metal-Ceramics and Porcelain-Veneered Lithium Disilicate Material Systems used in Dental Crowns  <i>Sukirti Dhital*, Camila Rodrigues, Yu Zhang, Jeongho Kim</i>	Mechanical Behavior of Additively Manufactured Metallic Cellular Scaffold Structures for Bone Tissue Engineering  <i>Mohammad Al-Barqawi*, Adeeb Rahman, Dan Thoma</i>	A Porosity Growth and Plasticity Model for Under-Dense Material Subject to Extreme Loadings  <i>John Moore*, Nathan Barton</i>
<b>#M409</b>	<b>Recent Advances in Computational Fracture Mechanics, Chair(s): John Dolbow</b>			
Multiscale Analysis and Design of Heterogeneous Materials Using an GFEM-Based Reduced-Order Modeling Approach  <i>David Brandyberry, Xiang Zhang, Philippe Geubelle*</i>	Multiscale Design of Nonlinear Materials with Reduced-Order Modeling  <i>David Brandyberry, Xiang Zhang*, Philippe Geubelle</i>	Singular Patch and Patch Superposition Method in IGA for Linear Fracture Mechanics Analysis  <i>Rino Watanabe, Daichi Nakahara, Omar Tabaza, Yuto Otaguro, Hiroshi Okada*</i>	Computation of Stress Intensity Factor for Arbitrary and Low Quality Meshes  <i>Kyoungsoo Park*, Habeun Choi, Hui-Ru Cui</i>	Numerical Analysis of Intergranular Fracture in Polycrystalline Materials  <i>Miguel Vieira de Carvalho*, Francisco Manuel Andrade Pires</i>
<b>#M413</b>	<b>Advances in High-Order Methods for Computational Fluid Dynamics, Chair(s): Krzysztof Fidkowski</b>			
An Adjoint-Based Super-Convergent Galerkin Approximation of Eigenvalues  <i>Shiqiang Xia*, Bernardo Cockburn</i>	Implicit Discontinuous Galerkin Methods for High-Speed Turbulent Flows on Graphics Processors  <i>Ngoc-Cuong Nguyen*, Jaime Peraire, Sebastien Terrana</i>	Improvements to Dual Weighted Residual Error Estimation and Adaptation for Asymptotically Consistent FEM Discretizations  <i>Ben L. S. Couchman*, David L. Darmofal, Steven R. Allmaras, Marshall C. Galbraith</i>	Development of High-Order, Super-Convergent Elements for Fluid Mechanics  <i>Mayuresh Patil*</i>	

## TS 5: TUESDAY AFTERNOON, JULY 27

2:00 PM	2:20 PM	2:40 PM	3:00 PM	3:20 PM
<b>#M416</b>	<b>Materials Modeling Across Scales: From First Principles Calculations to Mesoscale Physics, Chair(s): Amartya Banerjee</b>			
<p><b>Keynote presentation:</b> Scale Bridging Materials Physics: Active Learning Workflows and Integrable Deep Neural Networks for Free Energy Function Representations in Alloys</p> <p><i>Gregory Teichert*, Anirudh Natarajan, Sambit Das, Murat Aykol, Chirranjeevi Gopal, Vikram Gavini, Anton Van der Ven, Krishna Garikipati</i></p>	<p>Learning Based Multi-Scale Method and its Application to Inelastic Impact Problems</p> <p><i>Burigede Liu*, Nikola Kovachki, Andrew Stuart, Kaushik Bhattacharya</i></p>	<p>An Algorithm for Temporal Scale-bridging of Chemistry in a Multiscale Model of a Reacting Energetic Material</p> <p><i>Kenneth Leiter*, James Larentzos, Brian Barnes, Richard Becker, Jaroslaw Knap</i></p>	<p>Coarse-Grained Atomistic Simulation of Phase Transformation in Materials Under General Stresses: Methodology, Algorithm, and Applications</p> <p><i>Yipeng Peng*, Rigelesaiyin Ji, Thanh Phan, Wei Gao, Valery I. Levitas, Liming Xiong</i></p>	
<b>#M418</b>	<b>Computational Methods In Environmental Fluid Mechanics, Chair(s): Kazuo Kashiyama</b>			
<p>The Effects of CYGNSS-Enhanced Parametric Wind Fields on Storm Surge Modeling</p> <p><i>Ethan Kubatko*, Younghun Kang, Mohammad Al-Khaldi, Joel Johnson</i></p>	<p>An Octree Based LES Framework for Exploring the Impact of Vegetation on Thermal Response of the Building Environment</p> <p><i>Boshun Gao*, Kendrick Tan, Breanna Marmor, Jan Thompson, Yuyu Zhou, Ulrike Pässe, Baskar Ganapathysubramanian</i></p>	<p>Reynolds-Averaged and Large-Eddy Simulation Strategies for Langmuir Turbulence in the Coastal Ocean</p> <p><i>Andrés Tejada-Martínez*, Juan Penaloza-Gutierrez, Qiming Zhu, Anthony Perez, Jinhui Yan, Yuri Bazilevs</i></p>		
<b>#M502</b>	<b>Optimization of Materials and Structures, Including Shape and Topology: Direct and Inverse Problems, Chair(s): Emilio Carlos Nelli Silva</b>			
<p><b>Keynote presentation:</b> On the Development of Fluid Flow Topology Optimization with High Reynolds Numbers and Turbulence Models</p> <p><i>Renato Picelli*, Eduardo Moscatelli, Shahin Ranjbarzadeh, Rafael dos Santos Gioria, Emílio Carlos Nelli Silva</i></p>	<p>Topology Optimization Design of Blood Flow Devices Considering a Hemolysis Model</p> <p><i>Diego Hayashi Alonso*, Emilio Carlos Nelli Silva</i></p>	<p>Topology Optimization of Binary Structure Applied to Fluid-Structure Interaction of the Rotating Body for Non-Newtonian Fluid</p> <p><i>Shahin Ranjbarzadeh*, Renato Picelli, Emilio Carlos Nelli Silva</i></p>	<p>Novel Coupling Approach to Topology and Shape Optimization</p> <p><i>Gabriel Stankiewicz*, Chaitanya Dev, Paul Steinmann</i></p>	
<b>#M507</b>	<b>Mechanics and Microstructure of Two-Dimensional Materials, Chair(s): Ryan Sills</b>			
<p><b>Keynote presentation:</b> Mechanics of Architected 2D Materials</p> <p><i>Markus Buehler*</i></p>	<p>The Origins of Plasticity During High-Rate Bending of Graphene</p> <p><i>Landon Cordova*, Ryan Sills</i></p>	<p>Mesoscale Modeling of Facet Formation in Graphene-Metal Interfaces</p> <p><i>Nikhil Chandra Admal*, Tusher Ahmed, Mitisha Surana</i></p>		

## TS 5: TUESDAY AFTERNOON, JULY 27

2:00 PM	2:20 PM	2:40 PM	3:00 PM	3:20 PM
<b>#M510</b>	<b>Symposium on Trends in Unstructured Mesh Generation, Chair(s): Steven Owen</b>			
<p><b>Keynote presentation:</b> Towards Fully Automatic 3D NEFEM Mesh Generation</p> <p><i>Xi Zou*, Rubén Sevilla, Oubay Hassan, Kenneth Morgan</i></p>	<p>Parallel Overlay Grid Tet Mesh Generation with Combined Snapping &amp; Cutting with Automatic CAD Defeaturing</p> <p><i>Matt Staten*, David Noble, Corey McBride, C. Riley Wilson</i></p>	<p>Not So HOT Triangulations</p> <p><i>Scott Mitchell*, Patrick Knupp, Michael Deakin, Sarah Mousley</i></p>		
<b>#M513</b>	<b>Modeling and Simulation for Additive Manufacturing, Chair(s): A. Lew</b>			
<p>Residual Stress Modeling of a 17-4PH Cantilever Beam under Additive Manufacturing Conditions</p> <p><i>Phil DePond*, Adrian Lew, Yi Shu, Wei Cai, Brandon McWilliams</i></p>	<p>Modeling Analysis of UNSM's Effect on Residual Stress in Laser Directed Energy Deposition</p> <p><i>Kishore Mysore Nagaraja*, Wei Li, Youngsik Pyun, Dong Qian</i></p>	<p>A Fast Data-Driven Residual Strain and Stress Prediction in Stainless Steel 316L Laser Powder Bed Fusion Additive Manufacturing</p> <p><i>Praveen Vulimiri*, Albert To</i></p>	<p>A New Procedure for Implementing the Modified Inherent Strain Method with Improved Accuracy in Predicting Both Residual Stress and Deformation for Laser Powder Bed Fusion</p> <p><i>Wen Dong*, Xuan Liang, Qian Chen, Shawn Hinnebusch, Zekai Zhou, Albert To</i></p>	
<b>#M606</b>	<b>Design and Analysis of Modern and Robust Numerical Methods for Partial Differential Equations, Chair(s): David C. Del Rey Fernandez</b>			
<p>Robust Invariant Domain Preserving Approximation of the Compressible Navier-Stokes Equations</p> <p><i>Jean-Luc Guermond*</i></p>	<p>Entropy Stable Modal Discontinuous Galerkin Schemes and Wall Boundary Conditions for the Compressible Navier-Stokes Equations</p> <p><i>Yimin Lin*, Jesse Chan, Timothy Warburton</i></p>	<p>On Entropy Conservation and Kinetic Energy Preservation Methods</p> <p><i>H. C. Yee, Bjorn Sjogreen*</i></p>	<p>Reducing Errors in Data Refinement</p> <p><i>Jennifer Ryan*</i></p>	<p>Convergent Approximations to Global Minima of Integral Functionals Using Polynomial Optimization and Finite Element Methods</p> <p><i>Federico Fuentes*, Giovanni Fantuzzi</i></p>
<b>#M607</b>	<b>Advances in Numerical Methods for Linear and Non-Linear Dynamics and Wave Propagation, Chair(s): Alexander Idesman</b>			
<p><b>Keynote presentation:</b> A New Numerical Approach to Solution of PDEs with Optimal Accuracy on Irregular Domains and Interfaces using Cartesian Meshes. Application to Wave, Heat, Helmholtz, Poisson and Elasticity Equations.</p> <p><i>Alexander Idesman*</i></p>	<p>Time Multi-Scale Implicit/Explicit Co-Simulation Method for Extreme Loadings on Safety Elements</p> <p><i>Yvan Le Nôtre*, Michael Brun, Clément Grenat, Anthony Gravouil</i></p>	<p>Geomiso DNL: A Cloud-Based Software for Non-Linear Inelastic Dynamic Isogeometric Analysis</p> <p><i>Panagiotis Karakitsios*, Konstantinos Margaronis, Elektra Theloura</i></p>	<p>Unconditionally Stable Numerical Algorithms for Evolution of Point-Sources in Wave Propagation Problems</p> <p><i>William Sands*, Andrew Christlieb</i></p>	

## TS 5: TUESDAY AFTERNOON, JULY 27

2:00 PM	2:20 PM	2:40 PM	3:00 PM	3:20 PM
<b>#M610</b>	<b>Industrial Perspectives on Computational Mechanics, Chair(s): Timothy Truster</b>			
<p><b>Keynote presentation:</b> Computational Mechanics in the Upstream Oil and Gas Industry</p> <p><i>Xiao-Hui Wu*</i></p>	<p>Damage Detection of Plates with Ultrasonic Signals Using Autoencoders</p> <p><i>Soheil Sadeghi, Eshkevari*, Nur Sila Gulgec, Badri Hiriyur</i></p>	<p>Finite Element Tools for Performance Portability of Implicit and IMEX Simulations on Next Generation Architectures</p> <p><i>Roger Pawlowski*, Matthew Bettencourt, Eric Cyr, Edward Phillips, Eric Phipps, John Shadid, Christian Trott, Sean Miller</i></p>		
<b>#M614</b>	<b>Polygonal and Polyhedral Discretizations in Computational Mechanics, Chair(s): Joe Bishop</b>			
<p>A Mixed Finite Element Method With Piecewise Linear Elements for the Biharmonic Equation on Surfaces</p> <p><i>Oded Stein*, Eitan Grinspun, Alec Jacobson, Max Wardetzky</i></p>	<p>A Generalized Derivative Correction Methodology for Assuring Quadrature Consistency in Bubnov-Galerkin Polyhedral FEA</p> <p><i>Joseph Bishop*</i></p>	<p>Recent Advances in the VoroCrust Algorithm for Automatic Generation of Conforming Voronoi Meshes</p> <p><i>Mohamed Ebeida*, Tara LaForce, Joseph Bishop, William Mclendon</i></p>	<p>Two-Dimensional Elastic Fracture Analysis with the Extended Virtual Element Method</p> <p><i>Andrea Chiozzi*, Gianmarco Manzini, N. Sukumar, Elena Benvenuti</i></p>	
<b>#M617</b>	<b>Higher Order FE Methods for Challenging Problems in Science and Engineering, Chair(s): Leszek Demkowicz</b>			
<p><b>Keynote presentation:</b> Autonomous Finite Elements (AFE) – Are They Precursors of a Paradigm Shift?</p> <p><i>Zohar Yosibash*</i></p>	<p>A 19-Node ‘Lagrangian’ Second-Order Pyramid Element for Explicit Dynamic Nonlinear Solid Mechanics</p> <p><i>Robert Browning*, Kent Danielson, David Littlefield</i></p>	<p>High-Order Finite Elements for Lumped-Mass Explicit Modeling in Nonlinear Solid Dynamics</p> <p><i>Kent Danielson*, Robert Browning</i></p>		

## TS 6: TUESDAY EVENING, JULY 27

4:00 PM	4:20 PM	4:40 PM	5:00 PM	5:20 PM
<b>#M201</b>	<b>Imaging-Based Methods in Computational Medicine, Chair(s): Adrian Buganza Tepole</b>			
<p>PDE-Constrained Optimization Based Surface Registration for Biological Growth Problems</p> <p><i>Aishwarya Pawar*, David Umulis, Adrian Buganza Tepole</i></p>	<p>Computational Models for Simulating Collective Cell Migration in Wound Healing, Cancer Progression, and Gastrulation</p> <p><i>Zi Chen*, Joseph Sutlive, Catalina Spatarelu, Wenying Kang, Jacopo Ferruzzi, Melisa Fuentes, Hao Zhang, Ziqian Wu, Ming Guo, Jeffery Fredberg, Bing He</i></p>	<p>Moving Mesh Finite Element Models of BMP Signaling Network in Developing Zebrafish Embryos with Dynamic Cell Imaging Data</p> <p><i>Linlin Li*, Adrian Buganza-Tepole, David Umulis</i></p>	<p>Stiffness Mapping for Early Detection of Breast Cancer: Combined Force and Displacement Data</p> <p><i>Lorraine Olson*, Robert Throne</i></p>	
<b>#M202</b>	<b>Quantification and Modeling of Spatially Heterogeneous Phenomena in Biological Materials, Chair(s): Emma Lejeune, Manuel Rausch, Mona Eskandari</b>			
<p>Structure-Based Multi-Scale Modeling of the Intervertebral Disc</p> <p><i>Grace O'Connell*, Minhao Zhou, Benjamin Werbner</i></p>	<p>A 3-D Computational Homogenization Scheme for Multi-Scale Simulations of Fluid-Saturated Porous Media</p> <p><i>Ashkan Almasi*, Tim Ricken, David M. Pierce</i></p>	<p>Human Lamina Cribrosa Material Properties Using Inverse Finite Element Approach</p> <p><i>Hirut Kollech*, Reza Behkam, Jonathan Vande Geest</i></p>	<p>Using Poro-Elasticity to Model the Large Deformation of Tissue During Subcutaneous Injection</p> <p><i>Yu Leng*, Mario de Lucio, Hector Gomez</i></p>	
<b>#M206</b>	<b>Multiphysics and Data-Driven Modeling for Cardiovascular Biomedicine, Chair(s): Adarsh Krishnamurthy</b>			
<p><b>Keynote presentation:</b> Physics-Informed Deep Learning for 4D-Flow MRI</p> <p><i>Paris Perdikaris*, Sifan Wang, Georgios Kissas, Xinling Yu</i></p>	<p>Data-Driven Modeling of Injection-Caused Delamination on Aortic Walls Using DeepONet</p> <p><i>Minglang Yin*, Ehsan Ban, Enrui Zhang, Bruno Rego, Jay Humphrey, George Karniadakis</i></p>	<p>Hybrid Physics-Based and Data-Driven Modeling of Near-Wall Blood Flow with Physics-Informed Neural Networks</p> <p><i>Amirhossein Arzani*, Jian-Xun Wang, Roshan M Dsouza</i></p>	<p>Surrogate Modeling For 3-D Patient-Specific Hemodynamics Using Statistical Shape Modeling and Deep Learning</p> <p><i>Pan Du*, Xiaozhi Zhu, Jian-Xun Wang</i></p>	
<b>#M208</b>	<b>Mechanobiology of Cells, Vesicles and Biomembranes, Chair(s): Shaofan Li, Roger Sauer</b>			
<p><b>Keynote presentation:</b> Kinetics of Self-Assembly due to Lipid Membrane Thickness Interactions</p> <p><i>Prashant Purohit*, Xinyu Liao</i></p>	<p>A Hybrid Reaction-Diffusion-Monte Carlo Method for Modelling Signal Transduction in Crowded Environments</p> <p><i>Wylie Stroberg*, Santiago Schnell</i></p>			

## TS 6: TUESDAY EVENING, JULY 27

4:00 PM	4:20 PM	4:40 PM	5:00 PM	5:20 PM
<b>#M301</b>	<b>Advances and Applications of Mechanistic Machine Learning, Reduced-Order and Data-Driven Analyses, Chair(s): Lei Zhang, Ye Lu</b>			
<p>OnsagerNet: Learning Stable and Interpretable Dynamics Using a Generalized Onsager Principle</p> <p><i>Haijun Yu*, Xinyuan Tian, Weinan Ee, Qianxiao Li</i></p>	<p>Data Driven Approach for the Deformation of Multiwalled Carbon Nanotubes</p> <p><i>Upendra Yadav*, Shashank Pathrudkar, Susanta Ghosh</i></p>	<p>Machine Learning Discovery of High-Temperature Polymers</p> <p><i>Lei Tao*, Guang Chen, Ying Li</i></p>	<p>Hierarchical Deep Learning Neural Network (HiDeNN) for Molecular Simulations</p> <p><i>Chanwook Park*, Satyajit Mojumder, Sourav Saha, Wing Kam Liu</i></p>	<p>Extended DeepILST: Data-Driven Coarse-Graining of Multi-Atom Molecules at Various Thermodynamic States</p> <p><i>Jinu Jeong*, Alireza Moradzadeh, Narayana Aluru</i></p>
<b>#M311</b>	<b>Model Order Reduction for Physical Simulations, Chair(s): Matthew Zahr</b>			
<p>Parametrically Robust Model Reduction via Enrichment with Locally Supported Basis Functions</p> <p><i>Han Gao*, Matthew Zahr</i></p>	<p>Spatially Local Reduced-Order Bases for Accelerating Nonlinear Projection-Based Reduced-Order Models</p> <p><i>Spenser Anderson*, Charbel Farhat</i></p>	<p>Reduced Deep Networks: a Framework for Nonlinear Model Reduction</p> <p><i>Donsub Rim*, Luca Venturi, Joan Bruna, Benjamin Peherstorfer</i></p>	<p>Efficient Nonlinear Manifold Reduced Order Model</p> <p><i>Youngkyu Kim, Youngsoo Choi*, David Widemann, Tarek Zohdi</i></p>	
<b>#M324</b>	<b>Probabilistic Methods for Systems Identification Under Uncertainty, Chair(s): Mohamed Aziz Bhouri</b>			
<p>Neural Operator for Parametric Partial Differential Equations</p> <p><i>Zongyi Li*</i></p>	<p>Deep Learning of Parameterized Equations with Applications to Uncertainty Quantification</p> <p><i>Tong Qin, Zhen Chen*, John Jakeman, Dongbin Xiu</i></p>			
<b>#M325</b>	<b>Machine Learning for Solving Inverse Problems in Computational Mechanics and Materials, Chair(s): Anh Tran</b>			
<p>Physics Informed Generative Models for Morphology Reconstruction</p> <p><i>Dhruv Gamdha*, Augusto Menezes-Savaris, Kumar Saurabh, Adarsh Krishnamurthy, Baskar Ganapathysubramanian</i></p>	<p>Bayesian Inference via Conditional Generative Adversarial Networks</p> <p><i>Chengyang Huang*, Xun Huan</i></p>	<p>InvNet : Physics Informed GANs for Morphology Design</p> <p><i>Balaji Sesha Sarath Pokuri*, Viraj Shah, Ameya Joshi, Minsu Cho, Soumik Sarkar, Chinmay Hegde, Baskar Ganapathysubramanian</i></p>		



## TS 6: TUESDAY EVENING, JULY 27

4:00 PM	4:20 PM	4:40 PM	5:00 PM	5:20 PM
<b>#M403</b>				
<b>Computational Fluid Dynamics (CFD) and Fluid-Structure Interaction (FSI): Algorithms and Applications, Chair(s): Artem Korobenko</b>				
<p>An Immersogeometric Approach for Transmission Risk Assessment in Classrooms</p> <p><i>Kendrick Tan*, Boshun Gao, Cheng-Hau Yang, Emily Johnson, Ming-Chen Hsu, Adarsh Krishnamurthy, Alberto Passalacqua, Baskar Ganapathysubramanian</i></p>	<p>An Euler-Lagrange Model of the Transmission of Respiratory Ejecta Carrying SARS-CoV-2 in Enclosed Spaces</p> <p><i>Joseph Wilson*, Shelly Miller, Debanjan Mukherjee</i></p>	<p>Numerical Investigation of Healthcare Worker Exposure to Infectious Aerosols in Hospital Isolation Rooms and Extension to Lower Order Compartment Models</p> <p><i>Anthony Perez*, Juan Penaloza Gutierrez, Kiesha Pierre, Andres E. Tejada-Martinez</i></p>		
<b>#M408</b>				
<b>Computational Mechanics for Performance and Damage of Materials, Chair(s): Timothy Truster</b>				
<p>Modeling Cracks with Frictional Contact in Thermomechanics via Phase Field and Stabilized Variational Multiscale Method</p> <p><i>Wan Wan*, Pinlei Chen</i></p>	<p>Comparison between a Continuum and a Discrete Damage Model to Study the Sub-Ply Failure Mechanism of a Unidirectional Carbon Fiber Composite</p> <p><i>David Garoz Gomez*, Mark Flores, David Mollenhauer, Carlos Gonzalez</i></p>	<p>Buckling Analysis of Functionally Graded Curvilinearly Stiffened Plates Using Ritz Method with Jacobi Polynomials</p> <p><i>Mayank Agarwal*, Wei Zhao, Rakesh Kapania</i></p>		
<b>#M409</b>				
<b>Recent Advances in Computational Fracture Mechanics, Chair(s): Christian Linder</b>				
<p>Analysis of the Crack-Band Approach for Modelling Cracking in Concrete with Continuous Damage Models</p> <p><i>Gelacio Juarez Luna*, Gustavo Ayala Milián</i></p>	<p>Multiscale Reduced Order Discrete Damage Theory for Fracture of Composite Materials</p> <p><i>Zimu Su*, Caglar Oskay</i></p>	<p>Mesh Objective Fracture Modeling Using an Improved Smearred Crack Approach</p> <p><i>Joel Upston*, Howard Schreyer, Deborah Sulsky</i></p>	<p>Phase-Field Fracture Modeling for Chemically Strengthened Glass</p> <p><i>Revanth Matty, Shabnam Konica, Benedict Egboiyi, Trisha Sain*</i></p>	
<b>#M413</b>				
<b>Advances in High-Order Methods for Computational Fluid Dynamics, Chair(s): Krzysztof Fidkowski</b>				
<p>High-Order Large-Eddy Simulations of a Ducted Wind Turbine</p> <p><i>Chi Ding*, Bin Zhang, Chunlei Liang, Kenneth Visser, Guangming Yao</i></p>	<p>Entropy Stable Split Forms for the Flux Reconstruction High-Order Method: Three-Dimensional Curvilinear Numerical Validation</p> <p><i>Alexander Cicchino*, Siva Nadarajah</i></p>	<p>An Explicit Semi-Lagrangian Discontinuous Spectral Element Method for Solution of Stochastic Differential Equations</p> <p><i>Gustaaf Jacobs*, Hareshran Natarajan, Pavel Popov</i></p>	<p>Implicit Shock Tracking and the Method of Lines for Shock-Dominated, Unsteady Flows</p> <p><i>Andrew Shi*, Matthew Zahr, Per-Olof Persson</i></p>	

## TS 6: TUESDAY EVENING, JULY 27

4:00 PM	4:20 PM	4:40 PM	5:00 PM	5:20 PM
<b>#M416</b>	<b>Materials Modeling Across Scales: From First Principles Calculations to Mesoscale Physics, Chair(s): Vikram Gavini</b>			
<p>Tensor-Structured Algorithm for Reduced-Order Scaling Large-Scale Kohn-Sham Density Functional Calculations</p> <p><i>Chih-Chuen Lin*, Phani Motamarri, Vikram Gavini</i></p>	<p>Sparsity of the Tight Binding Potential Energy Surface</p> <p><i>Jack Thomas*, Christoph Ortner, Huajie Chen</i></p>	<p>Material Characterization from Non-Equilibrium Data Using the Jarzynski Equality</p> <p><i>Shenglin Huang*, Chuanpeng Sun, Prashant Purohit, Celia Reina</i></p>		
<b>#M502</b>	<b>Optimization of Materials and Structures, Including Shape and Topology: Direct and Inverse Problems, Chair(s): Scott Miller</b>			
<p><b>Keynote presentation:</b> Level Set Topology Optimization for Fluid-Structure Interactions</p> <p><i>Andreas Neofytou*, Feimi Yu, Lucy Zhang, H. Alicia Kim</i></p>	<p>Topology Optimization of Binary Structures for Soil-Structure Interaction Problems Using IBEM-FEM Coupled Analysis</p> <p><i>Rômulo Cortez*, Raghavendra Sivapuram, Persio Barros, Josue Labaki, Renato Picelli</i></p>	<p>Bayesian Topology Optimization for Efficient Design of Origami Folding Structures</p> <p><i>Sourabh Shende*, Andrew Gillman, David Yoo, Philip Buskohl, Kumar Vemaganti</i></p>		
<b>#M507</b>	<b>Mechanics and Microstructure of Two-Dimensional Materials, Chair(s): Teng Zhang</b>			
<p><b>Keynote presentation:</b> Atomistic Mechanism of Stress Modulated Phase Transition of 2D TMDC Materials</p> <p><i>Wei Gao*</i></p>	<p>Electro-Chemo-Mechanics of Two-Dimensional Materials-Based Energy Storage Systems</p> <p><i>Dibakar Datta*</i></p>	<p>Peeling and Sliding of Graphene Nanoribbons with Coupled Adhesive and Frictional Interactions</p> <p><i>Zhiming Xue, Rui Huang*</i></p>	<p>Crack Evolution in Multilayered 2D Materials Under the Presence of Interlayer Sliding</p> <p><i>Bo Ni*, Huajian Gao</i></p>	
<b>#M510</b>	<b>Symposium on Trends in Unstructured Mesh Generation, Chair(s): Matthew Staten</b>			
<p>Quasi-Structured Quadrilateral Meshing in Gmsh -- a Robust Pipeline for Complex CAD Models</p> <p><i>Jean-Francois Remacle*, Maxence Reberol, Christos Georgiadis</i></p>	<p>Overlay Grid Mesh Adaptation Using Discrete Interface Reconstruction</p> <p><i>Nicolas Le Goff*, Franck Ledoux, Jean-Christophe Janodet</i></p>	<p>Hex-Dominant Meshing with All-Hexahedral Boundary Layer</p> <p><i>Maxence Reberol*, Christos Georgiadis, Kilian Verhetsel, Jean-Francois Remacle</i></p>		

## TS 6: TUESDAY EVENING, JULY 27

4:00 PM	4:20 PM	4:40 PM	5:00 PM	5:20 PM
<b>#M513</b>	<b>Modeling and Simulation for Additive Manufacturing, Chair(s): M. Stender</b>			
<p><b>Keynote presentation:</b> Identification of Universal Scaling Laws in Additive Manufacturing with DimensionNet</p> <p><i>Zhengtao Gan*, Xiaoyu Xie, Wing Liu</i></p>	<p>Rapid Computation of Thermal Histories for Laser Powder Bed Fusion Additive Manufacturing Processes</p> <p><i>Daniel Moser*, Mario Martinez, Kyle Johnson, Theron Rodgers</i></p>	<p>An Immersed Boundary Method for Concrete Printing Applications</p> <p><i>Ignasius Wijaya*, Soonpil Kang, Arif Masud</i></p>		
<b>#M602</b>	<b>Computational Methods and Design for Impact and Safety Problems, Chair(s): Qian Wang, Howie Fang</b>			
<p><b>Keynote presentation:</b> Multiphysics Design on Si/C Composite Nanostructures for High-Energy-Density and Robust Lithium-Ion Battery Anode</p> <p><i>Xiang Gao*, Jun Xu</i></p>	<p>Coupled Mechanical-Electrochemical Phase-Field Model for Crack Propagation and Li Dendrite Growth in Solid-State Battery</p> <p><i>Chunhao Yuan*, Jun Xu</i></p>	<p>Meso-Scale Finite Element Simulation on Impact Failure Behavior of Two-Dimensional Triaxially Braided Composites</p> <p><i>Peng Liu*, Chao Zhang</i></p>		
<b>#M604</b>	<b>Isogeometric Methods, Chair(s): Yuri Bazilevs</b>			
<p><b>Keynote presentation:</b> Isogeometric Singular Enrichments for Multi-Material Corners</p> <p><i>Chun-Pei Chen, Ganesh Subbarayan*</i></p>	<p>Sharp Interface Isogeometric Solution to Reaction-Diffusion Problems</p> <p><i>Huanyu Liao*, Pavan Kumar Vaitheeswaran, Ganesh Subbarayan</i></p>	<p>Stochastic Isogeometric Analysis by Spline Dimensional Decomposition for Arbitrary Multi-Patch Domains</p> <p><i>Ramin Jahanbin*, Sharif Rahman</i></p>		
<b>#M606</b>	<b>Design and Analysis of Modern and Robust Numerical Methods for Partial Differential Equations, Chair(s): David C. Del Rey Fernandez</b>			
<p>Optimal Time Filtering Methods as General Linear Methods</p> <p><i>Sigal Gottlieb*, Zachary Grant, Victor DeCaria, William Layton</i></p>	<p>Adjoint Computations of Relaxation Runge-Kutta Methods</p> <p><i>Mario Bencomo*, Jesse Chan</i></p>	<p>Adaptive Moving Mesh Methods through Optimal Transport Theory</p> <p><i>Kelsey DiPietro*</i></p>	<p>On the Behavior of Entropy-Stable Schemes in the Low Mach Regime</p> <p><i>Ayoub Gouasmi*, Scott M. Murman, Karthik Duraisamy</i></p>	<p>Upwind Summation By Parts Finite Difference Methods for Large Scale Elastic Wave Simulations In Complex Geometries</p> <p><i>Kenneth Duru*, Christopher Williams, Frederick Fung</i></p>

## TS 6: TUESDAY EVENING, JULY 27

4:00 PM	4:20 PM	4:40 PM	5:00 PM	5:20 PM
<b>#M610</b>	<b>Industrial Perspectives on Computational Mechanics, Chair(s): John Evans</b>			
<p>Multi-Institution R&amp;D for Computational Mechanics Solutions</p> <p><i>Robert Ferencz*</i></p>	<p>Towards Structural Health Monitoring of a Miter Gate through a Computationally Efficient Digital Twin</p> <p><i>Travis Fillmore*, Zihan Wu, Manuel Vega, Zhen Hu, Michael Todd</i></p>	<p>Using Multiphysics and Multiscale Modeling Methods to Explore the Cross-Functional Application of Composites in Sustainable and Resilient Civil Infrastructure</p> <p><i>Zhiye Li*, Michael Lepech</i></p>		
<b>#M619</b>	<b>Stabilized, Multiscale, and Multiphysics Methods, Chair(s): Pinlei Chen</b>			
<p>Stabilized Coupled-Space-and-Time Framework to Model Periodic Flows</p> <p><i>Robert Dyja*, Biswajit Khara, Saurabh Kumar, Anupam Sharma, Baskar Ganapathysubramanian</i></p>	<p>A Multi-Space-Time-Scale Generalized FEM with Transient Local Enrichment and Adaptivity Conditioning Control for Parabolic and Hyperbolic Problems</p> <p><i>Lishen He*, Armando Duarte, Albert Valocchi</i></p>	<p>Projection Based Energy Stable Methods for Thermodynamically Consistent, Coupled Cahn-Hilliard Navier-Stokes Framework for Two Phase Flows</p> <p><i>Makrand Khanwale*, Kumar Saurabh, Milinda Fernando, Masado Ishii, Hari Sundar, James Rossmannith, Baskar Ganapathysubramanian</i></p>	<p>A Stabilized Interface Method for Fluid-Structure Interaction Across Non-Matching Meshes: Non-Newtonian Blood and Finitely Deforming Arteries</p> <p><i>Sharbel Nashar*, Soonpil Kang, Arif Masud</i></p>	

# **Wednesday, July 28**

**All times listed are in Central Daylight Saving Time.**

## TS 7: WEDNESDAY MORNING, JULY 28

10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM
<b>#M103</b>	<b>Symposium Honoring J. Tinsley Oden's Monumental Contributions to Computational Mechanics, Chair(s): Haim Waisman</b>			
<p><b>Keynote presentation:</b> Thermomechanical-Electromagnetic Coupling in Micromorphic Medium</p> <p><i>James Lee*, Jiaoyan Li</i></p>	<p>A Phase-Field Model of Plasticity</p> <p><i>Kumar Vemaganti*, Pietro Pascale</i></p>	<p>Solving Interface Inverse Problems by an Immersed Finite Element Method with a Fixed Mesh</p> <p><i>Tao Lin*</i></p>	<p>A Methodology for Characterizing Mechanical Parameters of Single-layer Graphene Sheet</p> <p><i>Alejandro Pacheco-Sanjuán*, Romesh Batra, Alvaro Tejos</i></p>	
<b>#M201</b>	<b>Imaging-Based Methods in Computational Medicine, Chair(s): Jessica Zhang</b>			
<p>Pulsatile Flow Investigation of Flow Pattern in Aortic Aneurysm Under Novel Stent Graft with Various Designs of Slit Perforations</p> <p><i>Chi Wei Ong*, Hwa Liang Leo, Pei Ho, Fangsen Cui</i></p>	<p>Patient Specific CFD Models Investigated in a Novel 0D-3D Numerical Framework, Based on 4D-MRI and CT Imaging</p> <p><i>Scott Black*, Konstantinos Ritos, Craig Maclean, Robbie Brodie, Pauline Hall-Barrientos, Asimina Kazakidi</i></p>	<p>Carotid Plaque Segmentation, Classification, 3D Reconstruction and Risk Stratification Using Ultrasound Images</p> <p><i>Nenad Filipovic*, Branko Arsic, Tijana Djukic, Smiljana Djorovic</i></p>	<p>Predicting Wall Shear Stress Using Simulation-Based Imaging</p> <p><i>Charles Naudet*, Matthew Zahr</i></p>	<p>Fast Multi-GPU Diffeomorphic Image Registration for Large-Scale Applications</p> <p><i>Malte Brunn*, Naveen Himthani, George Biros, Miriam Mehl, Andreas Mang</i></p>
<b>#M206</b>	<b>Multiphysics and Data-Driven Modeling for Cardiovascular Biomedicine, Chair(s): Debanjan Mukherjee</b>			
<p>Hemodynamics and Bio-Mechanics of Model Saccular Aneurysms of Basilar Artery Using Fluid Structure Interaction Simulations</p> <p><i>Nimmy Thankom Philip*, B. S. V. Patnaik, Sudhir B. J.</i></p>	<p>Computational Assessment of Stenoses Severity and Aortic Wall Mechanics in Patients with Supraaortic Aortic Stenosis</p> <p><i>Talha Lone*, Angelica Alday, Rana Zakerzadeh</i></p>	<p>Estimation of Arterial Viscoelasticity through Full-Wave Elastography</p> <p><i>Tuhin Roy*, Murthy Guddati</i></p>	<p>An Image-Based Finite Element Model for Vascular Remodeling in Pediatric Pulmonary Arterial Hypertension</p> <p><i>Reza Pourmodheji*, Zhenxiang Jiang, Christopher Tossas-Betancourt, C. Alberto Figueroa, Seungik Baek, Lik Chuan Lee</i></p>	
<b>#M208</b>	<b>Mechanobiology of Cells, Vesicles and Biomembranes, Chair(s): Elisa Budyn</b>			
<p><b>Keynote presentation:</b> Simulations of an Active Surface Immersed in Viscous Fluids</p> <p><i>Sebastian Aland*, Lucas Wittwer</i></p>	<p>Mechanical Properties of Scar Tissue of Hip Capsule Ligament for Different Implant Materials after a Total Hip Arthroplasty.</p> <p><i>Angelina Avgeri*, Bertrand Cinquin, Laurent Sedel, Pascal Bizot, Elisa Budyn</i></p>	<p>A Curvilinear Surface-ALE Formulation for Deforming Fluidic Membranes</p> <p><i>Roger A. Sauer*</i></p>		

## TS 7: WEDNESDAY MORNING, JULY 28

10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM
<b>#M301</b>	<b>Advances and Applications of Mechanistic Machine Learning, Reduced-Order and Data-Driven Analyses, Chair(s): Waiching Sun, Haiyang He</b>			
<p><b>Keynote presentation:</b> Estimation of the Magnitude of Deviatoric Stress in the Hypocentral Region of the 2019 Ridgecrest (Eastern California) Earthquakes</p> <p><i>Yuri Fialko*</i></p>	<p>DimensionNet: A Deep Learning Network for Discovering Dimensionless Numbers</p> <p><i>Xiaoyu Xie*, Zhengtao Gan, Wing Kam Liu</i></p>	<p>An Accelerated Hybrid Data-Driven/Model-Based Approach for Poroelasticity Problems with Multi-Fidelity Multi-Physics Data</p> <p><i>Bahador Bahmani*, WaiChing Sun</i></p>		
<b>#M324</b>	<b>Probabilistic Methods for Systems Identification Under Uncertainty, Chair(s): Mohamed Aziz Bhouri</b>			
<p><b>Keynote presentation:</b> Machine Learning for Fluid Mechanics</p> <p><i>Steven Brunton*</i></p>	<p>Sparsifying Priors for Bayesian Uncertainty Quantification in Model Discovery</p> <p><i>Seth Hirsh, David Barajas-Solano*, J. Nathan Kutz</i></p>	<p>Physics-Aware, Probabilistic Learning of Reduced-Order Systems in the Small Data Regime</p> <p><i>Sebastian Kaltenbach*, Phaedon-Stelios Koutsourelakis</i></p>	<p>A Function Space Variational Autoencoder</p> <p><i>Jacob Seidman*, Paris Perdikaris, George Pappas, Victor Preciado</i></p>	
<b>#M325</b>	<b>Machine Learning for Solving Inverse Problems in Computational Mechanics and Materials, Chair(s): Zhen Hu</b>			
<p>Data-Driven and Topological Design of Structural Metamaterials for Fracture Resistance</p> <p><i>Daicong Da*, Liwei Wang, Yu-chin Chan, Wei Chen</i></p>	<p>Accelerating Random Heterogeneous Material Design via Supervised ML: A Physically-Aware Approach</p> <p><i>Mohammad Hashemi*, Azadeh Sheidaei</i></p>	<p>Targeting Structure of Water Using Neural Network-Based Force Field</p> <p><i>Alireza Moradzadeh*, Amir Taqieddin, Narayana Aluru</i></p>	<p>Physics Informed Neural Networks for Extracting Phenomenological Models from Molecular Dynamics Simulations</p> <p><i>Chih-Hsuan Yang*, Balaji Pokuri, Shi Li, Martin Bazant, Chad Risko, Baskar Ganapathysubramanian</i></p>	
<b>#M401</b>	<b>Peridynamics and Its Applications, Chair(s): Erdogan Madenci</b>			
<p>Comparison of Meshfree Approach Based on Peridynamic Formulation and Meshless Local B-Spline Collocation Method for Heterogeneous Heat Conduction in Multi-Medium Materials</p> <p><i>Mas Irfan P. Hidayat*</i></p>	<p>Static Solution of Crack Propagation Problems by Coupled Three-Dimensional Peridynamics and High-Order One-Dimensional Finite Elements</p> <p><i>Alfonso Pagani, Marco Enea*, Erasmo Carrera</i></p>	<p>Viscoplastic Material with Shear Bands Effect</p> <p><i>Eligiusz Postek*, Zdzislaw Nowak, Ryszard Pecherski</i></p>	<p>An Approach to the Simulation of the Behaviour of Interfaces between the Layers of TRISO Coated Particle Nuclear Fuel with Peridynamics</p> <p><i>Angelo Battistini*, Thomas Haynes, Mark Wenman</i></p>	

## TS 7: WEDNESDAY MORNING, JULY 28

10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM
<b>#M402</b>	<b>Computational Geomechanics, Chair(s): SeonHong Na</b>			
<p>Time Domain, Intrusive Probabilistic Seismic Risk and Sensitivity Analysis of Nonlinear Earthquake Soil Structure Interaction Systems</p> <p><i>Hexiang Wang, Han Yang, Boris Jeremic*</i></p>	<p>Recent Progress on Computational Methods for Seismic Analysis of Underground Structures</p> <p><i>Haitao Yu*, Yong Yuan</i></p>	<p>Numerical Modeling of Rail Ballast Settlement</p> <p><i>Craig Foster*, Shubhankar Kulkarni</i></p>	<p>Spacetime-Adaptive Simulation of Earthquake Rupture on a Branch Fault System</p> <p><i>Amit Madhukar*, Xiao Ma, Robert Haber, Ahmed Elbanna, Reza Abedi</i></p>	<p>An Efficient Numerical Algorithm for Modeling of Seismic Cycles: Effect of Low Velocity Zones</p> <p><i>Mohamed Abdelmeguid*, Xiao Ma, Ahmed Elbanna</i></p>
<b>#M403</b>	<b>Computational Fluid Dynamics (CFD) and Fluid-Structure Interaction (FSI): Algorithms and Applications, Chair(s): Scott T. Miller</b>			
<p><b>Keynote presentation:</b> Bacterial Swimmers with a Polar Flagellar Bundle: Push, Pull, and Coil</p> <p><i>Sookkyung Lim*, Yongsam Kim, Jeungeun Park, Wanho Lee</i></p>	<p>A Coupled Fluid-Particle Solver for Active Suspensions</p> <p><i>Benjamin Deußen*, Florian Kummer, Martin Oberlack</i></p>	<p>Computational Fluid Dynamics of Blood Flow in the Human Heart</p> <p><i>Alberto Zingaro*, Luca Dede', Alfio Quarteroni</i></p>	<p>Image-Based Patient-Specific Flow Simulations are Consistent with Stroke in Pediatric Cerebrovascular Disease</p> <p><i>Shaolie Hossain*, Zbigniew Starosolski, Travis Sanders, Michael Johnson, Michael Wu, Ming-Chen Hsu, Dianna Milewicz, Ananth Annapragada</i></p>	
<b>#M414</b>	<b>Computational Methods for Modelling Stationary and Non-Stationary Interfaces at Multiple Scales, Chair(s): Mikhail Poluektov</b>			
<p><b>Keynote presentation:</b> High-Order Time-Stepping Methods for Cut Finite Element Discretizations of Evolving Domain Problems</p> <p><i>André Massing*, Simon Sticko, Balázs Kovács</i></p>	<p>Multigrid and Saddle-Point Preconditioners for Unfitted Finite Element Modeling of Inclusions</p> <p><i>Hardik Kothari*, Rolf Krause</i></p>	<p>Development of a Stable and Conserving Time-Integration Framework for Mortar-Based Contact Dynamics</p> <p><i>António Manuel Couto Carneiro*, Rodrigo Pinto Carvalho, Francisco Manuel Andrade Pires</i></p>	<p>CutFEM Approach for Handling Non-Stationary Interfaces in Large-Deformation Solid Mechanics: Application to Fracture</p> <p><i>Mikhail Poluektov*, Lukasz Figiel</i></p>	



## TS 7: WEDNESDAY MORNING, JULY 28

10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM
<b>#M502</b>	<b>Optimization of Materials and Structures, Including Shape and Topology: Direct and Inverse Problems, Chair(s): Emilio Carlos Nelli Silva</b>			
<p><b>Keynote presentation:</b> Data-Driven Topology Optimization of Spinodoid Metamaterials with Seamlessly Tunable Anisotropy</p> <p><i>Li Zheng*, Siddhant Kumar, Dennis Kochmann</i></p>	<p>Isogeometric Optimal Design of Auxetic Lattice Structures Considering Frictionless Beam-to-Beam Contact of Hyperelastic Cosserat Rods with Extensible Directors</p> <p><i>Myung-Jin Choi*, Roger A. Sauer, Sven Klinkel</i></p>	<p>Design of Graded Porous Bone-Like Structures via a Multi-Material Topology Optimization Approach</p> <p><i>Zhi Zhao*, Shelly Zhang</i></p>	<p>Topology Optimization of Nature-Inspired Vascular Materials</p> <p><i>Reza Pejman*, Ahmad Raeisi Najafi</i></p>	
<b>#M505</b>	<b>Computational Design of Architected Materials, Chair(s): Julián Norato, Jose Guedes</b>			
<p><b>Keynote presentation:</b> Stress State in Cubic Shell Lattices for Lightweight Mechanical Metamaterials: Interplay Between Geometry and Mechanics</p> <p><i>Michael Y. Wang*</i></p>	<p>Topology Optimization of Phononic Crystals with Smooth Boundary Descriptions Using an Enriched Finite Element Method</p> <p><i>Sanne van den Boom*, Reza Abedi, Fred van Keulen, Alejandro Aragón</i></p>	<p>Topology Optimization of Programmable Lattices via Geometry Projection</p> <p><i>Hesaneh Kazemi*, Julián Norato</i></p>		
<b>#M507</b>	<b>Mechanics and Microstructure of Two-Dimensional Materials, Chair(s): Bo Ni</b>			
<p>Crystalline Order of Colloids on a Curved and Deformable Elastic Membrane</p> <p><i>Luigi Perotti*, Shah Wasif Sazzad, Sanjay Dharmavaram</i></p>	<p>Symmetry-Breaking and Selection in Colloidal Assemblies on Curved Elastic Substrates</p> <p><i>Sanjay Dharmavaram*, Luigi Perotti</i></p>	<p>Characterizing the Polycrystalline Materials' Microstructure Resulting from Atomistic Simulations of Solidification: Methods, Algorithms, and Applications</p> <p><i>Hang Li*, Yipeng Peng, Ji Rigelesaiyin, Thanh Phan, Liming Xiong</i></p>		
<b>#M510</b>	<b>Symposium on Trends in Unstructured Mesh Generation, Chair(s): Franck Ledoux</b>			
<p>Tangled Finite Element Method (TFEM) for Quadrilateral Meshes</p> <p><i>Bhagyashree Prabhune*, Saketh Sridhara, Krishnan Suresh</i></p>	<p>Adaptive Spacetime Meshing in 3D x Time for Causal Spacetime Discontinuous Galerkin Solvers</p> <p><i>Christian Howard*, Amit Madhukar, Robert Haber, Jeff Erickson, Reza Abedi</i></p>	<p>U-Net Based Neural Network for Singularity Tracing of Quadrilateral Mesh</p> <p><i>Flavien Boussuge*</i></p>	<p>Machine Learning Applications for Defeaturing and Model Preparation</p> <p><i>Steven Owen*, Armida Carbajal, Matthew Peterson, Corey Ernst</i></p>	

## TS 7: WEDNESDAY MORNING, JULY 28

10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM
<b>#M513</b>	<b>Modeling and Simulation for Additive Manufacturing, Chair(s): J. Emery</b>			
<p>A Fast and Effective Sensitivity and Uncertainty Quantification for the Molten Pool in Metal Additive Manufacturing</p> <p><i>Juan Sebastian Rincon*, Arturo Montoya, Matthew Balcer, Harry Millwater, David Restrepo</i></p>	<p>A Data-Driven, Real-Time Thermal Process Simulation Model for Laser Powder Bed Fusion via Convolutional Neural Network and Long Short-Term Memory (CNN-LSTM)</p> <p><i>Qian Chen*, Albert To, Florian Dugast</i></p>	<p>Data-Driven Analysis of Thermal Simulations, Microstructure and Mechanical Properties of Inconel 718 Thin Walls Deposited by Metal Additive Manufacturing</p> <p><i>Lichao Fang*, Lin Cheng, Jennifer Glerum, Jennifer Bennett, David Dunand, Jian Cao, Gregory Wagner</i></p>	<p>An Image-Based Numerical Workflow for the Analysis of Additively Manufactured Lattice Structures</p> <p><i>Nina Korshunova*, Gianluca Alaimo, Iason Papaioannou, Seyyed Bahram Hosseini, Massimo Carraturo, Alessandro Reali, Jarkko Niiranen, Daniel Straub, Ferdinando Auricchio, Ernst Rank, Stefan Kollmannsberger</i></p>	
<b>#M601</b>	<b>Industrial Applications of IGA, Chair(s): Emily Johnson</b>			
<p><b>Keynote presentation:</b> Hybrid FEA/IGA Vehicle Crash Simulations in LS-DYNA</p> <p><i>Lukas Leidinger*, Stefan Hartmann, David Benson, Attila Nagy, Lambros Rorris, Ioannis Chalkidis, Frank Bauer</i></p>	<p>An Updated Lagrangian Framework for Isogeometric Kirchhoff–Love Thin–Shell Analysis</p> <p><i>Mert Alaydin*, Yuri Bazilevs</i></p>	<p>Blended Isogeometric Kirchhoff–Love and Continuum Shells with Application to Aircraft Horizontal Stabilizer Analysis</p> <p><i>Ning Liu*, Emily Johnson, Manoj Rajanna, Jim Lua, Nam Phan, Ming-Chen Hsu</i></p>	<p>Extending the Subset of Analysis-Suitable T-Splines: Various Extraordinary Points Per Face</p> <p><i>Xiaodong Wei, Xin Li, Kuanren Qian, Thomas J.R. Hughes, Yongjie Jessica Zhang, Hugo Casquero*</i></p>	
<b>#M602</b>	<b>Computational Methods and Design for Impact and Safety Problems, Chair(s): Chao Zhang, Jun Xu</b>			
<p><b>Keynote presentation:</b> Quantifying and Modeling of Stress-Driven Short-Circuit in Lithium-Ion Batteries in Electrified Vehicles</p> <p><i>Binghe Liu*</i></p>	<p>Injury Databank of Pedestrian with Various Realistic Pre-Impact Poses for Integrated Active and Passive Safety Technology</p> <p><i>Shi Shang*, Quan Li, Bingbing Nie</i></p>	<p>Coupled Mechanical-Electrochemical-Thermal Simulation for Short-Circuit Prediction of Lithium-Ion Batteries Under Mechanical Abuse</p> <p><i>Honggang Li*, Chao Zhang</i></p>		

## TS 7: WEDNESDAY MORNING, JULY 28

10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM
<b>#M604</b>	<b>Isogeometric Methods, Chair(s): Trond Kvamsdal</b>			
Condition Number Bounds for IETI-DP Methods that are Explicit in $h$ and $p$  <i>Rainer Schneckenleitner, Stefan Takacs*</i>	A Quadrature Free Approach for Isogeometric and Immersed Method in Trimmed Domains  <i>Pablo Antolin*</i>	Floating Isogeometric Analysis (FLIGA) for Simulations with Extreme Deformations  <i>Helge Christopher Hille*, Siddhant Kumar, Laura De Lorenzis</i>	Mollified Finite Element Approximants of Arbitrary Order and Smoothness  <i>Eky Febrianto*, Michael Ortiz, Fehmi Cirak</i>	Isogeometric Optimisation of Lattice-Skin Structures  <i>Xiao Xiao*, Fehmi Cirak</i>
<b>#M605</b>	<b>Isogeometric Spline Techniques on Complex Geometries, Chair(s): Xiaodong Wei</b>			
<b>Keynote presentation:</b> On the Construction of Locally Refined B-Splines with Preservation of Local Linear Independence  <i>Hendrik Speleers*, Carla Manni, Francesco Patrizi, Francesca Pelosi</i>	$C^1$ Hierarchical Splines on Multi-Patch Geometries for Isogeometric Analysis  <i>Cesare Bracco*, Carlotta Giannelli, Mario Kapl, Rafael Vázquez</i>	Piecewise Chebyshevian Splines for Isogeometric Analysis  <i>Carolina Beccari*, Marie-Laurence Mazure</i>	Spline Gauss Quadrature Rules for Refined Isogeometric Discretizations  <i>Ali Hashemian*, Michael Barton, David Pardo</i>	
<b>#M606</b>	<b>Design and Analysis of Modern and Robust Numerical Methods for Partial Differential Equations, Chair(s): David C. Del Rey Fernandez</b>			
Eigenanalysis and Non-Modal Analysis of Collocated Entropy Stable Discontinuous Galerkin Discretizations with the Summation-by-Parts Property  <i>Irving Enrique Reyna Nolasco*, Lisandro Dalcin, Matteo Parsani</i>	An Entropy-Stable Discontinuous Galerkin Scheme for Compressible Magnetohydrodynamics with Subcell Finite Volume Shock Capturing  <i>Andrés M Rueda-Ramírez*, Sebastian Hennemann, Florian J Hindenlang, Andrew R Winters, Gregor J Gassner</i>	Strongly Imposed and Entropy-Stable No-Slip Wall Boundary Condition  <i>Anita Gjesteland*, Magnus Svärd</i>		
<b>#M607</b>	<b>Advances in Numerical Methods for Linear and Non-Linear Dynamics and Wave Propagation, Chair(s): Alexander Idesman</b>			
Numerical Verification of Eigenvalue Analysis of Vibration of Elastic Circular Cylinder by Using Specific P-Wave Modes  <i>Takahiro Yamada*</i>	Precise and Efficient Time Integration Method for Linear Dynamics Systems  <i>Yi Ji*, Yufeng Xing</i>	One Dimensional Nonlinear Elastic Wave Propagation in a Reid's Rate-Independent Pinched Hysteretic Material  <i>Pravinkumar Ghodake*</i>	A Superconvergent Hybrid-Variable Discretization Method for Hyperbolic Problems  <i>Xianyi Zeng*, Md Mahmudul Hasan</i>	Passive-Seismic Inversion of an Effective Seismic Force Vector at a DRM Boundary in a 2D Truncated Domain, Subject to Incoming Earthquake Waves, Using Sparsely-Measured Surface Seismic Motions  <i>Bruno Guidio, Chanseok Jeong*</i>

## TS 7: WEDNESDAY MORNING, JULY 28

10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM
<b>#M609</b>	<b>Immersed Discretizations in Computational Mechanics: Mathematics, Algorithms, and Applications, Chair(s): Guglielmo Scovazzi</b>			
<p>Hybrid Optimization: Filling the Gap Between Topology and Shape Optimization with Machine Learning Techniques</p> <p><i>David Muñoz, Enrique Nadal, José Albelda, Juan José Ródenas*</i></p>	<p>Optimization of Structure Positions in an Acoustic Cavity Using XFEM, Reduced Models and a Gradient-Based Surrogate Model Approach</p> <p><i>Antoine Legay*, Luc Laurent</i></p>	<p>An Immersed Method for Finite Elements and Particles in an ALE Background Mesh with Contact</p> <p><i>Michael Puso*, Paul Tsuji</i></p>	<p>Massively Parallel Implementation of the Finite Cell Method on Incomplete Octrees</p> <p><i>Cheng-Hau Yang*, Kumar Saurabh, Hari Sundar, Adarsh Krishnamurthy, Baskar Ganapathysubramanian</i></p>	<p>Handling Neumann and Robin Boundary Conditions in an Immersed Boundary Method</p> <p><i>Ramakrishnan Thirumalaisamy*, Amneet Bhalla</i></p>
<b>#M610</b>	<b>Industrial Perspectives on Computational Mechanics, Chair(s): Varun Gupta</b>			
<p>Industrial Applications of Computational Mechanics to Support Applied Research and Product Development</p> <p><i>James Sobotka*, Ghadir Haikal</i></p>	<p>Isogeometric Analysis of Earthquake Load Mitigation on Two-Storey Building Using EPS Geofam</p> <p><i>Panagiotis Karakitsios, Spyridon Papoudos*, George Mylonakis</i></p>	<p>Modeling and Analysis of Air Flow in Parallel and Tilt Opening Windows</p> <p><i>Yihe (Grace) Huang, Chenzhang Wang, Tejav DeGanyar*</i></p>	<p>Interactive Geometric Modification of Massively Parallel CFD Simulations</p> <p><i>John Evans*, Corey Wetterer-Nelson, Kenneth Jansen</i></p>	
<b>#M615</b>	<b>Image Processing, Discretization, and Simulation of As-Built Geometries, Chair(s): Scott Roberts</b>			
<p><b>Keynote presentation:</b> MATBOX, an Open-Source Microstructure Analysis Toolbox for Meshing, Generation, Segmentation, and Characterization of 3D Heterogenous Volumes</p> <p><i>Francois Usseglio-Viretta*, Prehit Patel, Jeffery Allen, Aashutosh Mistry, Partha Mukherjee, Kandler Smith</i></p>	<p>Meshing Algorithm to Increase the Accuracy of Li-ion Batteries 3D Models</p> <p><i>Mehdi Chouchane*, Alejandro A. Franco</i></p>	<p>Artificial Generation of Representative Single Li-Ion Electrode Particle Architectures From Microscopy Data</p> <p><i>Orkun Furat*, Donal Finegan, Kandler Smith, Volker Schmidt</i></p>	<p>Image Segmentation for FIB-SEM Serial Sectioning of a Si/C–Graphite Composite Anode Microstructure Based on Preprocessing and Global Thresholding</p> <p><i>Dongjae Kim*, Jaewook Nam</i></p>	
<b>#M619</b>	<b>Stabilized, Multiscale, and Multiphysics Methods, Chair(s): Arif Masud</b>			
<p><b>Keynote presentation:</b> Comparing the Thermodynamically Consistent and Boussinesq Approaches for the Simulation of Buoyancy Flows</p> <p><i>Guillermo Hauke*, Jorge Lanzarote</i></p>	<p>Stabilized Finite Elements for a Logarithmic Reformulation of Viscoelastic Constitutive Laws</p> <p><i>Stefan Wittschieber*, Marek Behr, Leszek Demkowicz</i></p>	<p>A Variational Multiscale Method for Heterogeneous Structures</p> <p><i>Philipp Diercks*, Karen Veroy, Annika Robens-Radermacher, Jörg F. Unger</i></p>	<p>Development of a Novel Hybrid Algorithm for Applications in Fluid-Structure Interaction (FSI)</p> <p><i>Ramy Nemer*, Aurelien Larcher, Thierry Coupez, Elie Hachem</i></p>	

## TS 8: WEDNESDAY AFTERNOON, JULY 28

2:00 PM	2:20 PM	2:40 PM	3:00 PM	3:20 PM
<b>#M103</b>	<b>Symposium Honoring J. Tinsley Oden's Monumental Contributions to Computational Mechanics, Chair(s): Romesh Batra</b>			
<p>Combining Iterative Solvers with Randomization for Efficient Nonlinear Structural Optimization</p> <p><i>Eric de Sturler*</i></p>	<p>ParaMonte: A Parallel High-Performance Cross-Language Cross-Platform Toolbox for Monte Carlo Sampling, Uncertainty Quantification, and Visualization</p> <p><i>Amir Shahmoradi*, Fatemeh Bagheri, Shashank Kunnhare, Joshua Alexander Osborne</i></p>	<p>Development, Calibration, and Treatment Optimization of a Breast Cancer Model</p> <p><i>Ernesto A. B. F. Lima*, Reid Wyde, Anna G. Sorace, Thomas E. Yankeelov</i></p>		
<b>#M201</b>	<b>Imaging-Based Methods in Computational Medicine, Chair(s): Aishwarya Pawar, Jessica Zhang</b>			
<p>Personalized Virtual Cardiac Resynchronization Therapy to Predict and Optimize Long-Term Remodeling Outcome – A Case Study</p> <p><i>Pim Oomen*, Éric Lluch, Tiziano Passerini, Tommaso Mansi, Kenneth Bilchick, Jeffrey Holmes</i></p>	<p>Developing Pulmonary Biomechanics Models Using Digital Image Correlation: an Inverse Finite Element Analysis of Ex-Vivo Porcine Specimens</p> <p><i>Mohammad Maghsoudi-Ganjeh*, Crystal Mariano, Samaneh Sattari, Mona Eskandari</i></p>	<p>Hybrid CT Imagine-FEA Modeling and its Application in Medical Device Fatigue Analysis</p> <p><i>Haitao Zhang*</i></p>	<p>Patient-Specific Prediction of IMR Recurrence after Mitral Valve Surgical Repair</p> <p><i>Harshita Narang, Michael Sacks, Natalie Simonian*</i></p>	
<b>#M204</b>	<b>Interpretative and Predictive Modeling in Cardiovascular Medicine, Chair(s): Manuel Rausch, Alberto Figueroa, Colleen Witzenburg</b>			
<p><b>Keynote presentation:</b> Integration of Patient-Specific Computational Modeling Frameworks into the Clinical Setting to Advance the Detection of Coronary Atherosclerosis Progression and Plaque Vulnerability</p> <p><i>Lucas Timmins*, Caleb Berggren, Jack Wang, David Jiang, David Molony, Habib Samady</i></p>	<p>Transmural Distribution of Coronary Perfusion and Myocardial Work: an Insight from Computational Framework</p> <p><i>Lei Fan*, Ravi Namani, Jenny Choy, Ghassan Kassab, Lik Chuan Lee</i></p>	<p>A Computational Model of Myocardial Perfusion: Roles of Myogenic and Metabolic Responses in Coronary Autoregulation</p> <p><i>Hamidreza Gharahi*, Johnathan Tune, C. Alberto Figueroa, Daniel Beard</i></p>	<p>A Graph Theoretic Approach to Reduced Order Models in Coronary Blood Flow</p> <p><i>Elizabeth Livingston*, Alberto Figueroa, Krishna Garikipati</i></p>	

## TS 8: WEDNESDAY AFTERNOON, JULY 28

2:00 PM	2:20 PM	2:40 PM	3:00 PM	3:20 PM
<b>#M208</b>	<b>Mechanobiology of Cells, Vesicles and Biomembranes, Chair(s): Roger Sauer</b>			
<p>Surface Fluctuating Hydrodynamics Methods for the Drift-Diffusion Dynamics of Proteins and Microstructures within Curved Lipid Bilayer Membranes</p> <p><i>Paul Atzberger*</i></p>	<p>Tracking and Quantifying Human Bone Formation in a Bone-on-Chip</p> <p><i>Rachel Sagar, Bertrand Cinquin, Christine Chappard, Pascale Guillot, Elisa Budyn*</i></p>	<p>Constitutive Model of Erythrocyte Membranes with Distributions of Spectrin Orientations and Lengths</p> <p><i>Zhangli Peng*, Zhe Feng, Richard Waugh</i></p>	<p>On the Equations of Equilibrium for Asymmetric Tilted Lipid Bilayers</p> <p><i>Brett Hendrickson*, Milad Shirani, David Steigmann</i></p>	
<b>#M209</b>	<b>Computational Modeling of the Heart and its Valves, Chair(s): Michael Sacks</b>			
<p><b>Keynote presentation:</b> High-Speed Simulation of the 3D Behavior of Myocardium Using a Neural Network PDE Approach</p> <p><i>Wenbo Zhang*, Michael Sacks, Tan Bui</i></p>	<p>Multiscale Modeling of Fibrin Through Neural Network Homogenization of Discrete Fiber Networks</p> <p><i>Yue Leng*, Sarah Calve, Adrian Tepole</i></p>	<p>Machine Learning Based Interactive Geometry Modeling of Human Organ in 3D Medical Images for Computational Biomechanics</p> <p><i>Liang Liang*, Minliang Liu, Wei Sun</i></p>	<p>Functional Mechanics of the Murine Pulmonary Heart Valve</p> <p><i>Xinzeng Feng*, Michael Sacks</i></p>	
<b>#M301</b>	<b>Advances and Applications of Mechanistic Machine Learning, Reduced-Order and Data-Driven Analyses, Chair(s): Mohammad Amin Nabian, Haoyan Wei</b>			
<p>Localized Non-Intrusive Reduced-Order Modeling in the Operator Inference Framework</p> <p><i>Rudy Geelen*, Karen Willcox</i></p>	<p>Application of Transfer Learning in Multi-Fidelity Surrogate Model for Design Optimization</p> <p><i>Mushi Li*, Zhao Liu, Yang Li, Ping Zhu, Guosong Li, Zhenyan Gao</i></p>	<p>Reduced Order Homogenization of Polycrystalline Materials Undergoing Large Deformation</p> <p><i>Damin Xia*, Caglar Oskay</i></p>		
<b>#M302</b>	<b>Optimal Experimental Design in Computational Science and Engineering, Chair(s): Xun Huan</b>			
<p>A Fast and Scalable Computational Framework for Large-Scale and High-Dimensional Bayesian Optimal Experimental Design</p> <p><i>Keyi Wu*, Peng Chen, Omar Ghattas</i></p>	<p>Learning Optimal Priors</p> <p><i>Matthias Chung*</i></p>	<p>Bayesian Optimal Sensor Placement for Damage Detection under Steady-State Dynamics</p> <p><i>Mark Chen*, Kavinayan Sivakumar, Gregory Banyay, Timothy Walsh, Michael Zavlanos, Wilkins Aquino</i></p>		

## TS 8: WEDNESDAY AFTERNOON, JULY 28

2:00 PM	2:20 PM	2:40 PM	3:00 PM	3:20 PM
<b>#M310</b>	<b>Acceleration and Enhancement of High-Fidelity PDE Solvers Through Machine Learning, Chair(s): David C. Del Rey Fernandez</b>			
Data-Driven Modeling of Subgrid-Scale Processes Using Deep Neural Nets and Transfer Learning  <i>Pedram Hassanzadeh*, Ashesh Chattopadhyay, Yifei Guan, Adam Subel</i>	Learning Stochastic Closure Models for Multiscale Nonlinear Dynamics  <i>Jared Callaaham*, Georgios Rigas, Jean-Christophe Loiseau, Steven Brunton</i>	Learning Frame-Independent, Nonlocal Constitutive Relations on Unstructured Meshes with an Embedding Neural Network  <i>Xuhui Zhou*, Jiequn Han, Heng Xiao</i>	Non-Intrusive Parametric Reduced-Order Modeling via Operator Inference  <i>Shane McQuarrie*, Parisa Khodabakhshi, Karen Willcox</i>	Interface Learning: Towards Seamless Integration of Multi-Scale, Multi-Physics and Multi-Fidelity (M3) Models  <i>Shady Ahmed*, Suraj Pawar, Omer San, Adil Rasheed</i>
<b>#M313</b>	<b>Multiscale Methods and Data-Driven Models, Chair(s): Xingjie Li</b>			
Data-Driven Learning of Nonlocal Models: From High-Fidelity Simulations to Constitutive Laws  <i>Marta D'Elia*, Huaiqian You, Yue Yu, Stewart Silling</i>	Data-Driven Learning of Peridynamic Models for Graphene Sheets  <i>Huaiqian You*</i>	An Asymptotically Compatible Probabilistic Collocation Method for Randomly Heterogeneous Nonlocal Problems  <i>Yiming Fan*, Xiaochuan Tian, Xiu Yang, Xingjie Li, Clayton Webster, Yue Yu</i>	An Efficient Multi-Temperature Kinetic Method for the RVE Generation of Particle-Reinforced Heterogeneous Materials  <i>José L. P. Vila-Chã*, Bernardo P. Ferreira, F. M. Andrade Pires</i>	
<b>#M320</b>	<b>Advances in Data-Enriched Stochastic Simulation, Chair(s): Jaroslaw Knap</b>			
<b>Keynote presentation:</b> Tensor Random Fields with Fractal and Hurst Effects  <i>Martin Ostoja-Starzewski*</i>	Discovery of Defect Diffusion Mechanisms: Correlation and Uncertainty Quantification  <i>Thomas Swinburne*, Danny Perez</i>	Mixed Data Driven Fracture Mechanics  <i>Trenton Kirchdoerfer*, William Schill</i>	Uncertainty Quantification and Well-Posedness for Damage Mechanics  <i>Petr Plechac, Gideon Simpson*, Jerome Troy</i>	
<b>#M321</b>	<b>Data-Driven Modeling of Chaotic Systems and Turbulent Flows, Chair(s): Pedram Hassanzadeh, Rambod Mojgani</b>			
<b>Keynote presentation:</b> Data-Driven Analysis of Non-Normal Systems  <i>Benjamin Herrmann*, Peter J. Baddoo, Richard Semaan, Steven L. Brunton, Beverley J. McKeon</i>	Data-Driven Super-Parameterization Using Deep Learning: Experimentation with Multiscale Lorenz 96 Systems and Transfer Learning  <i>Ashesh Chattopadhyay*, Adam Subel, Pedram Hassanzadeh</i>	Physics-Informed Nonlocal Closure Schemes for Turbulent Flows  <i>Alexis-Tzianni Charalampopoulos*, Themistoklis Sapsis</i>	Data Driven RANS Closure with Model Derived Turbulence Variables  <i>Basu Parmar*, Kenneth Jansen, John Evans</i>	

## TS 8: WEDNESDAY AFTERNOON, JULY 28

2:00 PM	2:20 PM	2:40 PM	3:00 PM	3:20 PM
<b>#M324</b>	<b>Probabilistic Methods for Systems Identification Under Uncertainty, Chair(s): Mohamed Aziz Bhouri</b>			
<p><b>Keynote presentation:</b> Learning Interaction Laws in Particle- and Agent-Based Systems</p> <p><i>Mauro Maggioni*, Fei Lu, Jason Miller, Sui Tang, Ming Zhong</i></p>	<p>Learning Nonlocal Constitutive Models with Neural Networks</p> <p><i>Jiequn Han*, Xu-Hui Zhou, Heng Xiao</i></p>	<p>Generative Ensemble-Regression: Learn Particle Dynamics from Observations of Ensembles with Physics-Informed Deep Generative Models</p> <p><i>Liu Yang*, Constantinos Daskalakis, George Karniadakis</i></p>	<p>Sparse Methods for Automatic Relevance Determination</p> <p><i>Samuel Rudy*, Themistoklis Sapsis</i></p>	
<b>#M403</b>	<b>Computational Fluid Dynamics (CFD) and Fluid-Structure Interaction (FSI): Algorithms and Applications, Chair(s): John Evans</b>			
<p>An Adaptive Interface-Preserving Variational Formulation for Fully-Eulerian Fluid-Structure Interaction</p> <p><i>Biswajeet Rath*, Xiaoyu Mao, Rajeev Jaiman</i></p>	<p>Application of Mass Lumping and Nodal Quadrature to the Immersed Boundary Finite Element Method</p> <p><i>David Wells*, Ben Vadala-Roth, Jae Ho Lee, Boyce Griffith</i></p>	<p>A Robust and Accurate Variational Finite Element Formulation for Cavitating Hydrofoils with Fluid-Structure Interaction</p> <p><i>Suraj Kashyap*, Rajeev Jaiman</i></p>	<p>Simulating the Emergent Dynamics of Hydrodynamically-Coupled Active Particles</p> <p><i>Enkeleida Lushi*</i></p>	<p>A Mixed Interface-Capturing/Interface-Tracking Approach to Thermal Multi-Phase Flows with Emphasis on Metal Additive Manufacturing Processes</p> <p><i>Jinhui Yan*, Qiming Zhu</i></p>
<b>#M410</b>	<b>Multi-Scale and Multi-Physics Computations in Fluids and Solids, Chair(s): Yoizo Mikata</b>			
<p>Analysis of Semi- and Quarter-Elliptical Fatigue Crack Propagation</p> <p><i>Yoizo Mikata*</i></p>	<p>An Extended FIVER Framework for Modelling Laser-Fluid Coupling and Laser-Induced Cavitation</p> <p><i>Xuning Zhao*, Wentao Ma, Ben Zhao, Olivier Coutier-Delgosha, Kevin Wang</i></p>	<p>A Homogenized Continuum Model for Anisotropic Oxidation in Fiber-Reinforced Composites</p> <p><i>Shabnam Konica*, Trisha Sain</i></p>	<p>Multi-Scale Mechanical Model Coupled with an Energy-Based Criterion for Predicting Fracture Initiation in Strain-Crystallizing Rubbers</p> <p><i>Prajwal Kammardi Arunachala*, Reza Rastak, Christian Linder</i></p>	
<b>#M412</b>	<b>Recent Advances in Multi-Scale, Multi-Physics Computational Methods in Heterogeneous Porous Media, Chair(s): Pania Newell</b>			
<p>A Posteriori Error Estimates for Biot System Using Enriched Galerkin for Flow</p> <p><i>Vivette Girault, Xueying Lu, Mary Wheeler*</i></p>	<p>Computational Modeling of Two-Phase Flow in Deformable Porous Media</p> <p><i>Beatrice Riviere*, Boqian Shen</i></p>	<p>Anderson Acceleration for the Staggered Solution of Phase-Field Models for Fracture in Poroelastic Media</p> <p><i>Jakub Both*, Erlend Storvik, Michael Sargado, Jan Nordbotten, Florin Radu</i></p>	<p>Multiphase Reactive Poromechanical Modeling Of Non-Operable Glioblastoma IDH Wild Type</p> <p><i>Stéphane Urcun*, Giuseppe Sciumè, Pierre-Yves Rohan, Davide Baroli, Ruairidh Howells, Vincent Lubrano, Wafa Skalli, Stéphane Bordas</i></p>	



## TS 8: WEDNESDAY AFTERNOON, JULY 28

2:00 PM	2:20 PM	2:40 PM	3:00 PM	3:20 PM
<b>#M415</b>	<b>Model Coupling: Challenges and Connections for Climate and Mechanics, Chair(s): Jeff Connors</b>			
<p>The Interface-Flux-Recovery (IFR) Method for Conservative and Stable Coupling Schemes in Geophysical Fluids and Mechanics</p> <p><i>K. Chad Sockwell*, Kara Peterson, Paul Kuberry, Pavel Bochev</i></p>	<p>Global-in-Time Domain Decomposition Methods for the Coupled Stokes and Darcy Flows</p> <p><i>Thi Thao Phuong Hoang*, Hyesuk Lee, Hemanta Kunwar</i></p>	<p>Refactorization of Cauchy's Method: a Second-Order Partitioned Method for Fluid-Thick Structure Interaction Problems</p> <p><i>Martina Bukac, Anyastassia Seboldt*, Catalin Trenchea</i></p>	<p>A Thermo-Mechanical Model of Permafrost for the Simulation of Arctic Coastal Erosion</p> <p><i>Alejandro Mota, Jennifer Frederick, Irina Tezaur*, Diana Bull</i></p>	
<b>#M502</b>	<b>Optimization of Materials and Structures, Including Shape and Topology: Direct and Inverse Problems, Chair(s): Kai James</b>			
<p>Topology Optimization of Compliant Mechanisms with Variable Loading and Supports Using Gaussian Function Parameterization</p> <p><i>Lee Alacoque*, Kai James</i></p>	<p>Additive Manufacturing Process-Informed Topology Optimization</p> <p><i>Matthew Ireland*, Masoud Rais-Rohani, Brett Ellis</i></p>	<p>Metal Additive Manufacturing Process-Informed Topology Optimization</p> <p><i>Vignesh Perumal*, Alex Riensche, Reza Yavari, Lars Jacquemetton, Darren Beckett, Harold Scott Halliday, Kevin Cole, Prahalada Rao, Ahmad Najafi, Antonios Kotsos</i></p>	<p>Full Waveform Inversion through a Double-Sweeping Inexact Newton Method</p> <p><i>Abdelrahman Elmeliogy Elmeliogy*, Mehran Eslaminia, Murthy Guddati</i></p>	
<b>#M513</b>	<b>Modeling and Simulation for Additive Manufacturing, Chair(s): K. Johnson</b>			
<p>Direct Fused Deposition Modeling (FDM) Additive Manufacturing of Voxelized CAD Models</p> <p><i>Anushrut Jignasu*, Sambit Ghadai, Adarsh Krishnamurthy</i></p>	<p>A Process-Based Modeling Approach for Fused Filament Fabrication</p> <p><i>Christopher Bock*, Brett Ellis, Massoud Rais-Rohani</i></p>	<p>A Computational Photopolymerization Model for Volumetric Additive Manufacturing</p> <p><i>Todd Weisgraber*, Caitlyn Cook, Erika Fong, John Karnes, Kyle Champley, Maxim Shusteff</i></p>	<p>A Cohesive, Integrated Modeling and Simulation Workflow for Mechanical Response Characterization of Metallic Additively Manufactured Parts</p> <p><i>David Najera*, Marc Russell, Thomas Board, Eoghan O'Neill, Johnathan Tran, Liam Mackin, Elliot Haag</i></p>	

## TS 8: WEDNESDAY AFTERNOON, JULY 28

2:00 PM	2:20 PM	2:40 PM	3:00 PM	3:20 PM
<b>#M601</b>	<b>Industrial Applications of IGA, Chair(s): Guillermo Lorenzo</b>			
<p><b>Keynote presentation:</b> Recent Advances in Immersogeometric Analysis</p> <p><i>Ming-Chen Hsu*</i></p>	<p>HexGen and Hex2Spline: Polycube-Based Hexahedral Mesh Generation and Spline Modeling for Isogeometric Analysis Applications in LS-DYNA</p> <p><i>Yuxuan Yu*, Xiaodong Wei, Angran Li, Jialei Liu, Jeffrey He, Yongjie Zhang</i></p>	<p>Coreform IGA: Enabling Commercial Application of IGA</p> <p><i>Gregory Vernon*</i></p>	<p>Spline Based Simulations of Structural Instabilities in Flexible Viscoelastic Composites</p> <p><i>Kurtis Ford*, Aaron Bernreuther, Chris Whetten</i></p>	
<b>#M602</b>	<b>Computational Methods and Design for Impact and Safety Problems, Chair(s): Qing Li, David Weggel</b>			
<p>Crash Safety Evaluation of Three-Bar Metal Bridge Rail Using Finite Element Analysis</p> <p><i>Zheng Li*, Howie Fang, Qian Wang</i></p>	<p>Comparative Study of Constitutive Models for EPS Foam Under Combined Compression and Shear Loading</p> <p><i>Marcus Arnesen*, Artem Kulachenko, Peter Halldin, Jonathan Bergström</i></p>	<p>Analysis of Structural Components Subjected to Blast Loads Using blastFoam</p> <p><i>Jeff Heylmun*, Robert Browning, Tim Brewer, Peter Vonk</i></p>	<p>Lumbar Spine Mechanics During Vehicle Impact into Road Safety Barrier</p> <p><i>Lukasz Pachocki*, Karol Daszkiewicz, Piotr Luczkiewicz, Wojciech Witkowski</i></p>	
<b>#M604</b>	<b>Isogeometric Methods, Chair(s): Alessandro Reali</b>			
<p><b>Keynote presentation:</b> Distributed Time-Parallel Solution of Transient Problems with MGRIT and p-Multigrid Methods</p> <p><i>Matthias Möller*, Roel Tielen</i></p>	<p>A Generalized Kirchhoff-Love Shell Theory with Embedded Fibers and In-Plane Bending</p> <p><i>Xuan Thang Duong*, Vu Ngoc Khiem, Mikhail Itskov, Roger Sauer</i></p>	<p>Spectral Analysis of Isogeometric Discretizations of Eigenvalue Problems</p> <p><i>Sven-Erik Ekstrom, Carlo Garoni*, Thomas J. R. Hughes, Carla Manni, Francesca Pelosi, Alessandro Reali, Hendrik Speleers, Stefano Serra-Capizzano</i></p>	<p>The CGL2 A Posteriori Error Estimator for Isogeometric Analysis</p> <p><i>Trond Kvamsdal*, Mukesh Kumar, Abdullah Abdulhaque, Kjetil A. Johannessen, Arne Kvarving, Knut M. Okstad</i></p>	

## TS 8: WEDNESDAY AFTERNOON, JULY 28

2:00 PM	2:20 PM	2:40 PM	3:00 PM	3:20 PM
<b>#M605</b>	<b>Isogeometric Spline Techniques on Complex Geometries, Chair(s): Angran Li</b>			
<p>Isogeometric V-rep: Efficient and Robust Integration</p> <p><i>Xiaodong Wei*, Pablo Antolin, Annalisa Buffa</i></p>	<p>An Optimally Convergent Partition-of-Unity B-spline Construction for Unstructured Quadrilateral and Hexahedral Meshes</p> <p><i>Kim Jie Koh*, Eky Febrianto, Deepesh Toshniwal, Fehmi Cirak</i></p>	<p>An Adaptive Isogeometric Analysis Collocation Method with Higher Order PHT-Splines</p> <p><i>Yue Jia*, Cosmin Anitescu, Yongjie Zhang, Timon Rabczuk</i></p>	<p>AMR for Unstructured T-Splines with Linear Complexity</p> <p><i>Philipp Morgenstern*, Roland Maier, Thomas Takacs</i></p>	<p>Planar Domain Parameterization with Hierarchical B-Splines</p> <p><i>Maodong Pan*, Falai Chen</i></p>
<b>#M609</b>	<b>Immersed Discretizations in Computational Mechanics: Mathematics, Algorithms, and Applications, Chair(s): Guglielmo Scovazzi</b>			
<p>Efficient Numerical Quadrature for Unfitted Finite Element Methods: Perspectives and New Techniques</p> <p><i>David Gunderman*, Kenneth Weiss, John A. Evans</i></p>	<p>The Shifted Boundary Method for Embedded Solid Mechanics</p> <p><i>Nabil Atallah*, Claudio Canuto, Guglielmo Scovazzi</i></p>	<p>The Cut FEM for Structural Membranes and Shells</p> <p><i>Thomas-Peter Fries*</i></p>	<p>The Shifted Fracture Method</p> <p><i>Kangan Li*, Nabil Atallah, Antonio Rodriguez-Ferran, Guglielmo Scovazzi</i></p>	<p>An Immersed-Interface Finite Element Method for Linear Elasticity Using Four-Noded Rectangular Elements</p> <p><i>Srivatsa Bhat Kaudur*, Mayuresh Patil</i></p>
<b>#M611</b>	<b>Waves: Advanced Numerical Methods and Applications, Chair(s): Robert Haber</b>			
<p><b>Keynote presentation:</b> Stable High-Order Discretizations of Spectrally Convergent Radiation Boundary Conditions</p> <p><i>Thomas Hagstrom*</i></p>	<p>Symplectic Hamiltonian HDG Methods for Elastodynamics</p> <p><i>Manuel Sanchez*, Bernardo Cockburn, Ngoc-Cuong Nguyen, Jaime Peraire</i></p>	<p>Analysis of Higher Order Scattering Modes in Parameter Retrieval Method for the Characterization of Dispersive Media</p> <p><i>Reza Abedi*, Alireza Amirkhizi</i></p>		
<b>#M615</b>	<b>Image Processing, Discretization, and Simulation of As-Built Geometries, Chair(s): Scott Roberts</b>			
<p>Tomography Based Modelling and Design of Next Generation Lithium Ion Battery Electrodes</p> <p><i>Adam Boyce*, Emilio Martinez-Paneda, Xuekun Lu, Thomas Heenan, Aaron Wade, Dan Brett, Paul Shearing</i></p>	<p>Influence of Particle Morphology on the Expansion Behaviour of LiNi<sub>0.8</sub>Mn<sub>0.1</sub>Co<sub>0.1</sub>O<sub>2</sub> During Delithiation</p> <p><i>Nils Wenzler*, Federica Marone, Marco Stampanoni, Vanessa Wood</i></p>	<p>Uncertainty in 3D Image-Based Effective Property Simulations Using Bayesian Convolutional Neural Networks</p> <p><i>Chance A. Norris*, Tyler LaBonte, Carianne Martinez, Scott A. Roberts, Partha P. Mukherjee</i></p>	<p>Assessing Ideal Geometric Models of Woven Composites Using Image-Based Simulations</p> <p><i>Lincoln Collins*, Collin Foster, Scott Roberts</i></p>	<p>Ablating Woven Thermal Protection System Materials Under High Shear Flow Conditions</p> <p><i>Krishnan Swaminathan Gopalan*, Arnaud Borner, Nagi Mansour</i></p>

## TS 8: WEDNESDAY AFTERNOON, JULY 28

2:00 PM	2:20 PM	2:40 PM	3:00 PM	3:20 PM
<b>#M618</b>	<b>Enriched Finite Element Methods and Non-Intrusive Coupling Algorithms, Chair(s): Alejandro Aragon</b>			
<p>A High-Order Generalized Finite Element Method for Multiscale Structural Dynamics and Wave Propagation</p> <p><i>Alfredo Sanchez-Rivadeneira*, Carlos Armando Duarte</i></p>	<p>Stable, High-Order Solutions of the One-Dimensional Burgers' Equation Using a Generalized Finite Element Method</p> <p><i>Troy Shilt*, Patrick O'hara, Jack McNamara</i></p>	<p>Temporal Convergence and Stability Assessment of the Generalized Finite Element Method for Localized 1-D Heat Transfer</p> <p><i>TJ Miller*, Patrick O'hara, Jack McNamara</i></p>	<p>A Stable GFEM version Based on Nonconventional Partitions of Unity for Constructing Shape Functions</p> <p><i>Caio Ramos*, Sergio Proença, Murilo Bento</i></p>	
<b>#M619</b>	<b>Stabilized, Multiscale, and Multiphysics Methods, Chair(s): Guillermo Hauke</b>			
<p>A Viscous Regularization Framework for the Compressible Euler Equations Originating from VMS and Variation Entropy Theory</p> <p><i>Marco ten Eikelder*, Stein Stoter, Ido Akkerman, Yuri Bazilevs, Dominik Schillinger</i></p>	<p>A VMS Method for Advection-Diffusion Anisotropic Problems with Spectral Approximation of Sub-grid Scales</p> <p><i>Soledad Fernández-García*, Tomás Chacón Rebollo, Macarena Gómez-Mármol</i></p>	<p>A Self-Adapting LPS Solver for Laminar and Turbulent Flows</p> <p><i>Samuele Rubino*, Tomás Chacón Rebollo, Macarena Gómez Mármol</i></p>		

## TS 9: WEDNESDAY EVENING, JULY 28

4:00 PM	4:20 PM	4:40 PM	5:00 PM	5:20 PM
<b>#M204</b>	<b>Interpretative and Predictive Modeling in Cardiovascular Medicine, Chair(s): Manuel Rausch, Alberto Figueroa, Colleen Witzenburg</b>			
<p>Machine Learning Driven Contouring of High-Frequency Four-Dimensional Cardiac Ultrasound Data</p> <p><i>Frederick Damen*, David Newton, Guang Lin, Craig Goergen</i></p>	<p>Modeling Active and Passive Periaortic Interactions Using the Inverse Finite Element Method with in vivo DENSE-MRI data</p> <p><i>Johane Bracamonte*, John Wilson, Joao Soares</i></p>	<p>Using Predictive Simulations to Uncover the Effects of Ring-Based Annuloplasty on the Human Tricuspid Valve</p> <p><i>Mrudang Mathur*, William Meador, Marcin Malinowski, Tomasz Timek, Manuel Rausch</i></p>	<p>Modeling the Viscoelastic-Damage Mechanics of Blood Clot</p> <p><i>Manuel Rausch*, Gabriella Sugerman, Sotirios Kakaletsis, Berkin Dortdivanlioglu</i></p>	<p>Damage is an Important Dissipative Mechanism During Blood Clot Fracture</p> <p><i>John Toaquiza Tubon*, Vivek D Sree, Manuel K Rausch, Adrian Buganza Tepole</i></p>
<b>#M209</b>	<b>Computational Modeling of the Heart and its Valves, Chair(s): Lakshmi Dasi</b>			
<p>Towards Computational Modeling of Cardiac Valve Tissue: Rapid High Fidelity Valve Fiducial Localization Utilizing MicroCT Acquired Stereography</p> <p><i>Sam Stephens*, Neil Ingels, Jonathan Wenk, Morten Jensen</i></p>	<p>Effects of Heart Failure with Preserved Ejection Fraction on Left Ventricular Function and Coronary Perfusion</p> <p><i>Lei Fan, Yuexing Sun*, Lik Chuan Lee</i></p>	<p>Role of Mitral Valve Leaflet Pre-Strain in an Integrated Left Ventricle-Mitral Valve Model</p> <p><i>Hao Liu*, Michael Sacks</i></p>	<p>Computational Modeling of Transcatheter Heart Valves in Bicuspid Aortic Valves for Clinical Planning</p> <p><i>Breandan Yeats*, Sri Krishna Sivakumar, Pradeep Yadav, Vekateshwar Polsani, Vinod Thourani, Lakshmi Dasi</i></p>	<p>Transcatheter Heart Valve Accelerated Fatigue Modeling Parameters</p> <p><i>Sailahari Ponnaluri*, Michael Sacks, Keefe Manning</i></p>
<b>#M302</b>	<b>Optimal Experimental Design in Computational Science and Engineering, Chair(s): Xun Huan</b>			
<p>Sequential Optimal Experimental Design Using Reinforcement Learning with Policy Gradient</p> <p><i>Wanggang Shen*, Xun Huan</i></p>	<p>Risk-Averse Optimal Experiment Design Using R-Optimality for Vibration Control Inverse Problems</p> <p><i>Chandler Smith*, Drew Kouri, Timothy Walsh</i></p>	<p>Discrimination of Operating Regimes Using Physics-Informed Neural Networks in Motorized Systems</p> <p><i>Jeremy Shen, Sourav Banerjee, Gabriel Terejanu*</i></p>		
<b>#M305</b>	<b>Machine Learning and Uncertainty Quantification in Biological Systems, Chair(s): Luca Dede</b>			
<p>Physics-Informed Neural Networks for Cardiac Activation Mapping</p> <p><i>Francisco Sahli Costabal*, Yibo Yang, Paris Perdikaris, Daniel E. Hurtado, Ellen Kuhl</i></p>	<p>Construction and Inverse Identification of Stochastic Models for Soft Biological Tissues Based on Experiments</p> <p><i>Peiyi Chen*, Johann Guilleminot</i></p>	<p>Feasibility of Vascular Remodeling Parameter Estimation for Assessing Hypertensive Pregnancy Disorders</p> <p><i>Georgios Kissas*, Eileen Hwuang, Nadav Schwartz, Walter R. Witschey, John A. Detre, Paris Perdikaris</i></p>	<p>Uncertainty Quantification of TMS Simulations Considering Spatially-Determined MRI Data Segmentation Errors</p> <p><i>Hao Zhang*, Luis Gomez, Johann Guilleminot</i></p>	<p>A Modified Bayesian Convolutional Neural Network for Breast Histopathology Image Classification and Uncertainty Quantification</p> <p><i>Ponkrshnan Thiagarajan*, Pushkar Khairnar, Susanta Ghosh</i></p>

## TS 9: WEDNESDAY EVENING, JULY 28

4:00 PM	4:20 PM	4:40 PM	5:00 PM	5:20 PM
<b>#M310</b>	<b>Acceleration and Enhancement of High-Fidelity PDE Solvers Through Machine Learning, Chair(s): David C. Del Rey Fernandez</b>			
<p>Low-Rank Registration Based Manifolds for Convection-Dominated PDEs</p> <p><i>Rambod Mojgani*, Maciej Balajewicz</i></p>	<p>A Neural Ordinary Differential Equations Approach to Modeling Chemical Kinetics</p> <p><i>Opeoluwa Owoyele*, Pinaki Pal</i></p>	<p>Element-Local Approach to Error Estimation Using Machine Learning</p> <p><i>David Del Rey Fernandez*, Romit Maulik</i></p>	<p>Multigrid Poisson Solvers Using Super-Resolved Interpolation</p> <p><i>Francisco Holguin*, Sidharth GS, Gavin Portwood</i></p>	
<b>#M313</b>	<b>Multiscale Methods and Data-Driven Models, Chair(s): Yue Yu</b>			
<p>Parareal Physics-Informed Neural Network for Solving Time-Dependent PDEs</p> <p><i>Zhen Li*, Xuhui Meng, George Karniadakis</i></p>	<p>Operator Learning for Predicting Multiscale Bubble Growth Dynamics</p> <p><i>Chensen Lin Lin*, Zhen Li, Lu Lu, Shengze Cai, Martin Maxey, George Karniadakis</i></p>	<p>Guaranteeing Exact Structure Preservation and Consistency in Data-Driven Modeling</p> <p><i>Nathaniel Trask*</i></p>	<p>Estimating the Mechanical Property of Short Fiber Reinforced Plastic using Viscosity Model with Multiscale Simulation</p> <p><i>Hirofumi Sugiyama*, Shigenobu Okazawa</i></p>	
<b>#M316</b>	<b>Material Model Calibration for Computational Engineering Analysis, Chair(s): John Emery</b>			
<p>Bayesian Calibration of Continuum Crystal Plasticity Models</p> <p><i>Thao Nguyen*, Devin C. Francom, Saryu J. Fensin, Justin W. Wilkerson, D.J. Luscher</i></p>	<p>Using Hierarchical Bayesian Calibration with Diverse Experimental Data to Parameterize the PTW Strength Model for Ti-6Al-4V Alloys</p> <p><i>Devin Francom*, David Walters, Sky Sjue, JeeYeon Plohr, Ayan Biswas, Darby Luscher</i></p>	<p>Bayesian Genetic Programming Symbolic Regression with Preferential Search</p> <p><i>Karl Garbrecht*, Nolan Strauss, Geoffrey Bomarito, Patrick Leser, Jacob Hochhalter</i></p>	<p>Bayesian Calibration of Interatomic Potential Models for Binary Alloys</p> <p><i>Arun Hegde*, Elan Weiss, Wolfgang Windl, Habib Najm, Cosmin Safta</i></p>	
<b>#M317</b>	<b>Machine Learning and Data-Driven Modeling to Simulate Damage, Fracture and Failure, Chair(s): Geoffry Bomarito</b>			
<p>Effective Machine Learning-Based Calibration of Finite Element Models for Progressive Damage and Failure Simulation of Fiber-Reinforced Composites</p> <p><i>Navid Zobeiry*, Johannes Reiner, Reza Vaziri</i></p>	<p>Parametrically Homogenized Continuum Damage Mechanics (PHCDM) Models for Composites using Physics-Informed Machine Learning</p> <p><i>Xiaofan Zhang*, Yanrong Xiao, Daniel O'Brien, Somnath Ghosh</i></p>	<p>Improved Plasticity and Damage Models by Symbolic Regression of Microscale Finite Element Simulations</p> <p><i>Donovan Birky*, Jacob Zamora, John Emery, Coleman Alleman, Brian Lester, Geoffrey Bomarito, Jacob Hochhalter</i></p>	<p>Advanced Identification of Material Law for Micro- and Macro-scale Deformation of Alloys</p> <p><i>Sourav Saha*, Ye Lu, Wing Kam Liu</i></p>	<p>Sensitivity of Void Mediated Failure to Geometric Design Features of Porous Metals</p> <p><i>G.H. Teichert, M. Khalil*, C. Alleman, K. Garikipati, R.E. Jones</i></p>

## TS 9: WEDNESDAY EVENING, JULY 28

4:00 PM	4:20 PM	4:40 PM	5:00 PM	5:20 PM
<b>#M320</b>	<b>Advances in Data-Enriched Stochastic Simulation, Chair(s): Gideon Simpson</b>			
<p><b>Keynote presentation:</b> On Learning/Solving Differential Equations with Kernels</p> <p><i>Houman Owhadi*</i></p>	<p>Stochastic Gradient Descent from the Piecewise Deterministic Markov Processes Perspective</p> <p><i>Ting Wang*, Kenneth W. Leiter, Jaroslaw Knap</i></p>	<p>Multi-Fidelity Bayesian Neural Networks for Inverse PDE Problems with Noisy Data</p> <p><i>Xuhui Meng*, George Karniadakis</i></p>		
<b>#M321</b>	<b>Data-Driven Modeling of Chaotic Systems and Turbulent Flows, Chair(s): Pedram Hassanzadeh, Rambod Mojgani</b>			
<p>Stochastic Deep Learning Parameterization of Ocean Momentum Forcing</p> <p><i>Arthur Guillaumin*, Laure Zanna</i></p>	<p>Simulation of Unsteady Compressible Navier Stokes Equations Using a Data-Enriched Finite Element Method</p> <p><i>Rohit Deshmukh*, Vilas Shinde, Troy Shilt, Jack McNamara</i></p>	<p>On Development of an Invariant Data-Driven Anisotropic Subgrid Scale Stress Model for Large-Eddy Simulation</p> <p><i>Aviral Prakash*, Kenneth Jansen, John Evans</i></p>	<p>Toward Improved Heat Transfer Models for Strongly-Coupled, Gas-Solid Flows</p> <p><i>Sarah Beetham*, Aaron Lattanzi, Jesse Capececiatro</i></p>	<p>Physics Guided Machine Learning in Fluid Dynamics</p> <p><i>Suraj Pawar*, Omer San, Adil Rasheed</i></p>
<b>#M323</b>	<b>Model-Aware Machine Learning Methods for Science and Engineering Problems, Chair(s): Alex Gorodetsky</b>			
<p>Learning Missing Mechanisms in a Dynamical System from a Subset of State Variable Observations</p> <p><i>Teresa Portone*, Erin Acquesta, Raj Dandekar, Chris Rackauckas, Ahmad Rushdi</i></p>	<p>Error-Curve Analysis of Neural Network and Linear Stochastic Estimation for Fluid Flow Problems</p> <p><i>Taichi Nakamura*, Kai Fukami, Koji Fukagata</i></p>	<p>Multiscale DNN for Stationary Navier Stokes Equations with Oscillatory Solutions</p> <p><i>Lizuo Liu*, Wei Cai, Bo Wang</i></p>	<p>Parameter Influence of Supervised/Unsupervised use of Convolutional Neural Networks for Fluid Flow Analyses</p> <p><i>Masaki Morimoto*, Kai Fukami, Kai Zhang, Aditya G. Nair, Koji Fukagata</i></p>	<p>Solving Bayesian Inverse Problems via Variational Autoencoders</p> <p><i>Hwan Goh, Sheroze Sherriffdeen, Jonathan Wittmer, Tan Bui-Thanh*</i></p>
<b>#M403</b>	<b>Computational Fluid Dynamics (CFD) and Fluid-Structure Interaction (FSI): Algorithms and Applications, Chair(s): David Kamensky</b>			
<p>Control Informed Fully Resolved Multiphase Simulations of Wave Energy Converters</p> <p><i>Kaustubh Khedkar*, Amneet Bhalla</i></p>	<p>Numerical Study on Active Control of Limit Cycle Oscillation with Energy Harvesting</p> <p><i>Shigeki Kaneko*, Shinobu Yoshimura</i></p>	<p>An LBM/MD/IBM Method for the Simulation of Composite Foam Processing</p> <p><i>Mohammadmehdi Ataei*, Erfan Pirmorad, Franco Costa, Sejin Han, Chul Park, Markus Bussmann</i></p>		

## TS 9: WEDNESDAY EVENING, JULY 28

4:00 PM	4:20 PM	4:40 PM	5:00 PM	5:20 PM
<b>#M404</b>	<b>Active Materials and Structures, Chair(s): Shawn Chester</b>			
Constitutive and Application Modeling of Glass-Ceramic Materials  <i>Brian Lester*, Kevin Long</i>	Accelerated Computational Micromechanics and its Applications to Polydomain Liquid Crystal Elastomers  <i>Hao Zhou*, Kaushik Bhattacharya</i>	Modeling Photo-Sensitive Polymeric Gels  <i>Nikola Bosnjak*, Shawn Chester</i>		
<b>#M411</b>	<b>Nonlocal Models in Continuum Mechanics: Mathematical, Computational, Machine Learning Aspects, Chair(s): Petronela Radu</b>			
Core Shells and Double Bubbles for a Three-Phase Nonlocal Model with Surface Tension  <i>Stan Alama, Lia Bronsard*, Xinyang Lu, Chong Wang</i>	Traces on General Sets without Differentiability  <i>Mikil Foss*</i>	Asymptotic Analysis of a Coupled System of Nonlocal Equations with Oscillatory Coefficients  <i>Tadele Mengesha*, James Scott</i>	Harnack Inequality for Fractional Elliptic Equations in Nondivergence Form  <i>Mary Vaughan*, Pablo Raúl Stinga</i>	Regularity Theory for Nonlocal Space-Time Master Equations  <i>Animesh Biswas*, Marta De-Leon Contrears, Pablo Stinga</i>
<b>#M412</b>	<b>Recent Advances in Multi-Scale, Multi-Physics Computational Methods in Heterogeneous Porous Media, Chair(s): Pania Newell</b>			
Morphometric Characterization of Strength in Porous Media  <i>Alexandre Guevel*, Hadrien Rattiez, Manolis Veveakis</i>	Numerical Integration of a Novel Directional Damage Model for Rate-Dependent Behavior of Brittle Rocks  <i>Mitul Sisodiya*, Yida Zhang</i>	Investigating the Effect of Grain Structure on Compressive Response of Open-Cell Metal Foam Using High-Fidelity Crystal-Plasticity Modeling  <i>Dongfang Zhao*, Kristoffer Matheson, Quinton Johnson, Brian Phung, Steve Petruzza, Michael Czabaj, Ashley Spear</i>		
<b>#M415</b>	<b>Model Coupling: Challenges and Connections for Climate and Mechanics, Chair(s): Chad Sockwell</b>			
Accurate and Efficient Partitioned Approaches for Conjugate Heat Transfer  <i>Jeffrey Banks*</i>	High-Spatial Resolution Ice-Sheet Modeling: Leveraging Parallelized Techniques to Accelerate Time to Solution  <i>Anjali Sandip*, Mathieu Morlighem</i>	Modeling of Orthotropic Hygrothermal Behavior for Various Wood Species Based on Collected Isotherm Database  <i>Danyang Tong*, Brown Susan Alexis, David Corr, Gianluca Cusatis</i>	Mass Conserving Implicit-Explicit (IMEX) Methods for a Coupled Compressible Navier-Stokes Equations  <i>Shinhoo Kang*, Emil Constantinescu, Hong Zhang, Robert Jacob</i>	



## TS 9: WEDNESDAY EVENING, JULY 28

4:00 PM	4:20 PM	4:40 PM	5:00 PM	5:20 PM
<b>#M501</b>	<b>Local-to-Nonlocal and Nonlocal-to-Nonlocal Coupling Methods: Advances in Coupling Techniques and Treatment of Interfaces in Nonlocal Mechanics and Diffusion, Chair(s): Pablo Seleson</b>			
<p>Modeling Spall in Additively Manufactured Steel with Local-Nonlocal Coupling</p> <p><i>Stewart Silling*, John Mitchell</i></p>	<p>Nonlocal Phase-Field Models for Describing Sharp Interface Dynamics</p> <p><i>Olena Burkovska*</i></p>	<p>An Energy-Based Coupling Approach to Interface Problems in Nonlocal Diffusion</p> <p><i>Giacomo Capodaglio*, Marta D'Elia, Pavel Bochev, Max Gunzburger</i></p>	<p>A Fractional Model for Anomalous Diffusion with Increased Variability</p> <p><i>Marta D'Elia, Christian Glusa*</i></p>	<p>Nonlocal-to-Nonlocal Coupling via Subdomain-Dependent Kernels</p> <p><i>Christian Vollmann*, Volker Schulz</i></p>
<b>#M502</b>	<b>Optimization of Materials and Structures, Including Shape and Topology: Direct and Inverse Problems, Chair(s): Ahmad Najafi</b>			
<p>An Overview of Interface- and Discontinuity-Enriched Finite Element Methods with Emphasis on Topology Optimization</p> <p><i>Alejandro Aragón*, Sanne van den Boom, Jian Zhang, Dongyu Liu, Angelo Simone, Fred van Keulen</i></p>	<p>On Tailoring Fracture Toughness: Level-Set Topology Optimization Using an Interface-Enriched Formulation</p> <p><i>Jian Zhang*, Fred Van Keulen, Alejandro Aragón</i></p>	<p>Shape Sensitivity Analysis of Linear and Nonlinear Functionals in Structural Topology Optimization: Theory and Practice</p> <p><i>Aaron Klein*, Prasanth Nair, Masayuki Yano</i></p>		
<b>#M513</b>	<b>Modeling and Simulation for Additive Manufacturing, Chair(s): R. Ferencz</b>			
<p>Topology Optimization of 2D Heat Exchangers for Additive Manufacturing Based on Isogeometric Analysis and Machine Learning</p> <p><i>Xuan Liang*, Angran Li, Anthony Rollett, Yongjie Zhang</i></p>	<p>Topology Optimization of Support Structures for a Layer by Layer Simulation with Plasticity</p> <p><i>Florian Dugast*, Albert To</i></p>	<p>Predicting the Influence of Scanning Strategies and Geometrical Features on Melt Pool Size Variability and Lack of Fusion Porosity During LPBF</p> <p><i>Alaa Olleak*, Florian Dugast, Albert To</i></p>	<p>Iterative Simulation-Based Techniques for Control of Laser Powder Bed Fusion Additive Manufacturing</p> <p><i>Jeff Irwin*, Qian Wang, Pan Michaleris, Abdalla Nassar, Yong Ren, Christopher Stutzman</i></p>	<p>Reverse Shape Compensation via a Gradient-Based Moving Particle Optimization Method for Elastoplastic Problems</p> <p><i>Hao Deng*, Albert To</i></p>
<b>#M601</b>	<b>Industrial Applications of IGA, Chair(s): Hugo Casquero</b>			
<p>An Immersogeometric Formulation for Free-Surface Flows with Application to Marine Engineering Problems</p> <p><i>Qiming Zhu*, Jinhui Yan</i></p>	<p>Modeling and Isogeometric Analysis of Thin Layered Structures Using Volumetric NURBS</p> <p><i>Harshil Shah*, Onur Rauf Bingol, Emily Johnson, Manoj Rajanna, Ming-Chen Hsu, Adarsh Krishnamurthy</i></p>	<p>Tricuspid Valve Parameterization, Geometric Modeling, and Isogeometric Analysis</p> <p><i>Emily Johnson*, Devin Laurence, Fei Xu, Caroline Crisp, Chung-Hao Lee, Ming-Chen Hsu</i></p>		

## TS 9: WEDNESDAY EVENING, JULY 28

4:00 PM	4:20 PM	4:40 PM	5:00 PM	5:20 PM
<b>#M605</b>	<b>Isogeometric Spline Techniques on Complex Geometries, Chair(s): Jessica Zhang, Yuxuan Yu</b>			
<p>Multiresolution Spline Topology Optimization with Volumetric Subdivision Representation of Complex Geometry</p> <p><i>Gang Xu*, Jin Xie, Zhenyu Dong, Jinlan Xu, Jessica Zhang, Bernard Mourrain, Charlie Wang</i></p>	<p>Geomiso SEA: A Cloud-Based Software for Non-Linear Inelastic Static Isogeometric Analysis of Complex Multi-Patch Geometries with Shell Elements</p> <p><i>Panagiotis Karakitsios, Panagiotis Kolios, Vasiliki Tsotoulidi*, George Mprellas</i></p>	<p>TCB-Spline Based Isogeometric Method with High Quality Parameterization</p> <p><i>Juan Cao*, Zhihao Wang, Xiaodong Wei, Yongjie Jessica Zhang</i></p>	<p>Parametric Stitching for Smooth Coupling of Subdomains with Non-Matching Discretizations</p> <p><i>Yaxiong Chen*, Chun-Pei Chen, Ganesh Subbarayan</i></p>	
<b>#M609</b>	<b>Immersed Discretizations in Computational Mechanics: Mathematics, Algorithms, and Applications, Chair(s): Guglielmo Scovazzi</b>			
<p>XIGA: an eXtended IsoGeometric Analysis Framework for Multi-Phase Interface Problems.</p> <p><i>Lise Noel*, Mathias Schmidt, Keenan Doble, John A. Evans, Kurt Maute</i></p>	<p>An Immersed Boundary Formulation for Thermally Coupled Incompressible Turbulent Flows</p> <p><i>Soonpil Kang*, Arif Masud</i></p>	<p>Immersogeometric Analysis of Flow Over Point Cloud Representations of Objects</p> <p><i>Aditya Balu*, Joel Khristy, Manoj Rajanna, Ming-Chen Hsu, Adarsh Krishnamurthy</i></p>	<p>Mesh Convergence Study for Fluid-Structure Interaction Problems Using Non-Conforming Methods</p> <p><i>Chen Shen*, Scott Miller, Lucy Zhang</i></p>	<p>Simple H-R-H Adaptation for Immersed Geometries for CFD Applications</p> <p><i>Sacha El Aouad*, Aurélien Larcher, Elie Hachem</i></p>
<b>#M611</b>	<b>Waves: Advanced Numerical Methods and Applications, Chair(s): Reza Abedi</b>			
<p>Structure-Aware Taylor Schemes for Propagating Hyperbolic Solutions Through Tents</p> <p><i>Jay Gopalakrishnan*, Joachim Schöberl, Dow Drake, Christoph Wintersteiger</i></p>	<p>A Scalable Distributed Architecture for a Spacetime Parallel-Adaptive Hyperbolic Solver</p> <p><i>Robert Haber*, Amit Madhukar, Christian Howard, Volodymyr Kindratenko, Reza Abedi</i></p>	<p>Space-Time Discontinuous Galerkin Methods for Fluid-Rigid Body Interaction Problems</p> <p><i>Tamas Horvath*</i></p>	<p>Minimum-Residual Scalable Multigrid Solver for High-Frequency Wave Propagation</p> <p><i>Jacob Badger*, Leszek Demkowicz</i></p>	
<b>#M615</b>	<b>Image Processing, Discretization, and Simulation of As-Built Geometries, Chair(s): Matthew Staten</b>			
<p><b>Keynote presentation:</b> A New Strategy for Automated Tetrahedral Mesh Generation for Producing Credible Discretizations from 3D Image Data</p> <p><i>David Noble*, Scott Roberts, Matthew Staten, Corey McBride, C. Riley Wilson</i></p>		<p>A Surface-Mesh Gradation Tool for Generating Optimized Tetrahedral Meshes of Microstructures with Defects</p> <p><i>Brian Phung*, Junyan He, Ashley Spear</i></p>		

## TS 9: WEDNESDAY EVENING, JULY 28

4:00 PM	4:20 PM	4:40 PM	5:00 PM	5:20 PM
<b>#M616</b>	<b>Phase-Field Modeling and Simulation in Computational Mechanics, Chair(s): Shiva Rudraraju</b>			
<p>Phase Field Models of the Growth of Tumors Embedded in an Evolving Vascular Network: Dynamic 1D-3D Models of Angiogenesis</p> <p><i>Prashant K. Jha, Marvin Fritz*, Tobias Koppl, J. Tinsley Oden, Andreas Wagner, Barbara Wohlmuth</i></p>	<p>Modeling Multi-Neuron Growth with Dendritic Spines Using Isogeometric Collocation and Phase Field Model</p> <p><i>Kuanren Qian*, Aishwarya Pawar, Ashlee Liao, Victoria Webster-Wood, Yongjie Jessica Zhang</i></p>	<p>Scale-Free Phase-Field Modeling of Phase Transformation in Zirconium</p> <p><i>Raghuandan Pratoori*, Hamed Babaei, Valery Levitas</i></p>		
<b>#M618</b>	<b>Enriched Finite Element Methods and Non-Intrusive Coupling Algorithms, Chair(s): Armando Duarte</b>			
<p><b>Keynote presentation:</b> An Enriched Finite Element Method for Stiff Interfaces</p> <p><i>Amir Latifaghili, Milad Bybordiiani, Emre Erkmen, Daniel Dias-da-Costa*</i></p>	<p>A XFEM - Cohesive Zone Model Coupled Approach for 3D Numerical Modeling of Ductile Failure</p> <p><i>Jean-Philippe Crété*, Konstantinos Nikolakopoulos, Patrice Longère</i></p>	<p>An Interface-Enriched Generalized Finite Element Formulation for Locking-Free Coupling of Non-Conforming Discretizations and Contact</p> <p><i>Dongyu Liu*, Sanne J. van den Boom, Alejandro M. Aragón, Angelo Simone</i></p>		

# Thursday, July 29

All times listed are in Central Daylight Saving Time.

## TS 10: THURSDAY MORNING, JULY 29

10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM
<b>#M203</b>	<b>Cell-Scale Mechanics, Tissue-Scale Mechanics and Mechanobiology, Chair(s): Shiva Rudraraju</b>			
A High-Fidelity 3D Micromechanical Model of Ventricular Myocardium  <i>David Li*, Michael Sacks</i>	On the Relation Between 3D Aortic Valve Interstitial Cell Shape and Contractile Behavior  <i>Alex Khang*, Quan Nguyen, Xinzeng Feng, Michael Sacks</i>	Biomembranes Undergo Complex, Non-Axisymmetric Deformations Governed by Kirchhoff-Love Kinematics and Revealed by a Three-Dimensional Computational Framework  <i>Debabrata Auddya*, Xiaoxuan Zhang, Rahul Gulati, Ritvik Vasan, Padmini Rangamani, Krishna Garikipati, Shiva Rudraraju</i>	Adhesion Modulates Cell Morphology and Migration Within Dense Fibrous Networks  <i>Rui Travasso*, Maurício Moreira-Soares, José Rafael Bordin, Susana P Cunha</i>	
<b>#M205</b>	<b>Growth and Remodeling of Living Tissues, Chair(s): Shuolun Wang</b>			
<b>Keynote presentation:</b> A Novel Time-Evolving Model for the In-Vivo Maturing Collagen in Engineered Tissues  <i>Michael Sacks*</i>	Multi-Physics Models of Soft Tissue Mechanobiology, from Wounds to Organoids  <i>Adrian Tepole*, Yifan Guo, David Sohutskey, Bumsoo Han, Sherry Voytik-Harbin, Sarah Calve</i>	Simulation of Interactive Biological Networks: A Phase-field Approach to Slime Molds Development  <i>Christian Peco*, Farshad Ghanbari, Francesco Costanzo</i>		
<b>#M302</b>	<b>Optimal Experimental Design in Computational Science and Engineering, Chair(s): Peng Chen</b>			
Maximization of the Expected Information Gain of Experiments Using Stochastic Gradient Descent  <i>André Carlon*, Ben Dia, Luis Espath, Rafael Lopez, Raúl Tempone</i>	Edge-Promoting Adaptive Bayesian Experimental Design for X-Ray Imaging  <i>Tapio Helin, Nuutti Hyvönen*, Juha-Pekka Puska</i>	E-Optimum Sensor Selection for Estimating a Subset of Parameters  <i>Dariusz Ucinski*</i>	Efficient Model Order Reduction Schemes for Dynamic Contact Problems  <i>Diana Manvelyan*, Bernd Simeon, Utz Wever</i>	Sensor Selection for Configuration-Dependent Linear Bayesian Inverse Problems  <i>Nicole Aretz*, Peng Chen, Denise Degen, Karen Veroy</i>
<b>#M305</b>	<b>Machine Learning and Uncertainty Quantification in Biological Systems, Chair(s): Paris Perdikaris</b>			
Enhancing Reduced Order Models for Cardiac Electrophysiology by Machine/Deep Learning Algorithms  <i>Andrea Manzoni*, Stefania Fresca, Stefano Pagani</i>	A Symphony of Data-Based, Physics-Based, and Agent-Based Models to Create a COVID-19-Safe Corridor for International Travel  <i>Prathamesh Desai*, Nihar Sawant, Achal Khilnani</i>	Fast Characterization of Inducible Regions of Atrial Fibrillation Models with Multi-Fidelity Gaussian Process  <i>Lia Gander*, Simone Pezzuto, Paris Perdikaris, Rolf Krause, Francisco Sahli Costabal</i>	Adaptive Surrogate Autoregressive Flow for Parameter Estimation with Expensive Computational Models  <i>Yu Wang*, Fang Liu, Daniele Schiavazzi</i>	Uncertainty Quantification of Electro-Poration Ablation Effect in Liver Cancer  <i>Davide Baroli*, Karen Veroy-Grepl, Tan Zhipeng</i>

## TS 10: THURSDAY MORNING, JULY 29

10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM
<b>#M310</b>	<b>Acceleration and Enhancement of High-Fidelity PDE Solvers Through Machine Learning, Chair(s): Romit Maulik</b>			
<p>Latent Variable-Based Analysis with Machine Learning for Reduced-Order Modeling and Control of Fluid Flows</p> <p><i>Kai Fukami*, Kazuto Hasegawa, Taichi Nakamura, Shoei Kanehira, Koji Fukagata</i></p>	<p>Object Detection in a Through-the-Wall Setting Utilizing Machine Learning</p> <p><i>Daniel Pomerico*, Aihua Wood</i></p>	<p>Field Solutions of Parametric PDEs</p> <p><i>Biswajit Khara*, Aditya Balu, Ameya Joshi, Adarsh Krishnamurthy, Soumik Sarkar, Chinmay Hegde, Baskar Ganapathysubramanian</i></p>		
<b>#M313</b>	<b>Multiscale Methods and Data-Driven Models, Chair(s): Xingjie Li</b>			
<p>Multi-Scale Modeling of Dislocation Dynamics</p> <p><i>Eduardo Barros de Moraes*, Mohsen Zayernouri</i></p>	<p>Imposing Physical Constraints Softly on Augmented Gaussian Random Fields</p> <p><i>Xiu Yang*</i></p>	<p>Reduced-Order Multiscale Modeling of Elasto-Plastic Porous Metal Alloys</p> <p><i>Shiguang Deng*, Carl Soderhjelms, Ramin Bostanabad</i></p>		
<b>#M316</b>	<b>Material Model Calibration for Computational Engineering Analysis, Chair(s): Tom Seidl</b>			
<p>The Modified Error in Constitutive Equation Formulation for the Shear Wave Elastography Inverse Problem</p> <p><i>Olalekan Babaniyi*, Wilkins Aquino</i></p>	<p>MatCal: A Specialized Dakota Tool to Assist in Advanced Material Model Calibration</p> <p><i>Matthew Kury*, Kyle Karlson</i></p>	<p>Unraveling the Implications of Finite Specimen Size on the Interpretation of Dynamic Experiments for Polycrystalline Metals through Numerical Simulations</p> <p><i>Bryan Zuanetti*, Darby Luscher, Kyle Ramos, Cynthia Bolme</i></p>	<p>Calibration of Elastoplastic Constitutive Model Parameters from Full-Field Data with Automatic Differentiation-Based Sensitivities</p> <p><i>Daniel Seidl*, Brian Granzow</i></p>	
<b>#M317</b>	<b>Machine Learning and Data-Driven Modeling to Simulate Damage, Fracture and Failure, Chair(s): Kyle Johnson</b>			
<p><b>Keynote presentation:</b> Deep Learning Model to Predict Fracture Mechanisms of Graphene and Other Brittle Materials</p> <p><i>Markus Buehler, Andrew Lew*</i></p>	<p>Interpretation of Convolutional Neural Networks for Predicting Volume Requirements in Studies of Microstructurally Small Cracks</p> <p><i>Karen DeMille*, Ashley Spear</i></p>	<p>Multifidelity Failure Probability Estimation with Adaptively Designed Surrogate Models</p> <p><i>James Warner*, David Cole, Robert Gramacy, Patrick Leser, Geoffrey Bomarito, William Leser</i></p>		

## TS 10: THURSDAY MORNING, JULY 29

10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM
<b>#M320</b>	<b>Advances in Data-Enriched Stochastic Simulation, Chair(s): Ting Wang</b>			
Optimal Finite-Rank Approximation of Koopman Operators: Theory, Methods and Challenges  <i>Hao Wu*</i>	Randomized Multilevel Monte Carlo Methods for Inference  <i>Kody Law*, Ajay Jasra</i>	Multiple Projection Markov Chain Monte Carlo Algorithms on Submanifolds  <i>Wei Zhang*, Tony Lelièvre, Gabriel Stoltz</i>	Multiscale Global Sensitivity Analysis for Stochastic Chemical Reaction Networks  <i>Alen Alexanderian*, Michael Merritt, Pierre Gremaud</i>	
<b>#M322</b>	<b>Robust and Verifiable Data-Driven Analysis and Design Using Machine Learning, Chair(s): Ramakrishna Tippireddy</b>			
Parametric Topology Optimization and Design Space Exploration with Deep Learning and Scientific Visualization  <i>Vahid Keshavarzadeh*, Robert Kirby, Akil Narayan</i>	Data-Driven Learning of Effective Coefficients from Multiscale Data  <i>Jun Sur Park*, Xueyu Zhu</i>	Reinforcement Learning-Driven Adaptive Mesh Refinement for Second-Order Elliptic Boundary Value Problems  <i>Natasha Sharma*, Ramakrishna Tipireddy, Samrat Chatterjee</i>	Bounding Discretization Errors of Physics-Informed Neural Network Solutions in Elasticity  <i>Mengwu Guo*, Ehsan Haghighat</i>	Utilizing the Orthogonality Relation of the Thickness-Averaged Structural Intensity to Extract the Mode Scattering Coefficients in Multi-Mode and Multi-Directional Wave Field  <i>Shuai Cao*, Yue Hu, Jing Xiao, Fangsen Cui</i>
<b>#M323</b>	<b>Model-Aware Machine Learning Methods for Science and Engineering Problems, Chair(s): Rebecca Morrison</b>			
Functional Tensor Network Approximations for Earth System Models  <i>Cosmin Safta*, Alex Gorodetsky, John Jakeman, Khachik Sargsyan</i>	Physics-Aware Deep-Learning-Based Proxy for Petroleum Reservoir Simulation Models  <i>Emilio Coutinho*, Eduardo Gildin</i>	Multi-Output Surrogate Construction for Fusion Simulations  <i>Kathryn Maupin*, Anh Tran</i>	Physics-Defined Deep Learning Frameworks on Mechanics of Moving Interfaces: Application to Fluid-Structure Interaction  <i>Rachit Gupta*, Rajeev Jaiman</i>	
<b>#M403</b>	<b>Computational Fluid Dynamics (CFD) and Fluid-Structure Interaction (FSI): Algorithms and Applications, Chair(s): Jinhui Yan</b>			
OpenFOAM Based Modeling and Simulation of Aluminium Smelting Process  <i>Nithin Panicker*, Rajneesh Chaudhary, Prashant Jain, Vivek Rao, Marc Delchini</i>	A Flexible High-Fidelity Thermal CFD Framework for Quenching Processes  <i>Ze Zhao*, Jinhui Yan</i>	Towards Full Eulerian Framework for Fluid-Solid-Heat Treatment  <i>Joe Khalil*, Ramy Nemer, Aurelien Larcher, Rudy Valette, Elisabeth Massoni, Elie Hachem</i>	Finite Element Modeling of Contact Formation in an External Gear Pump  <i>Vincent de Bie*, Martien Hulsens, Patrick Anderson</i>	

## TS 10: THURSDAY MORNING, JULY 29

10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM
<b>#M404</b>	<b>Active Materials and Structures, Chair(s): Shawn Chester</b>			
Exploiting the Piezoelectric Effect for Energy Harvesting - A Finite Element System Simulation Approach  <i>Andreas Hegendörfer*, Julia Mergheim</i>	Constitutive Modeling of Magneto-Active Composites with Fibrous and Particulate Terfenol-D Reinforcements  <i>You-Shu Zhan, Chien-hong Lin*</i>	Thermo-Mechanical Behavior of Dielectric Viscoelastomers  <i>Keven Alkhoury, Shawn Chester*</i>		
<b>#M410</b>	<b>Multi-Scale and Multi-Physics Computations in Fluids and Solids, Chair(s): Yozo Mikata</b>			
Grain Size Dependence of Polycrystalline Plasticity Modeling in Cylindrical Indentation  <i>George Z. Voyiadjis*, Juyoung Jeong, Jeffrey W. Kysar</i>	Oblique Scattering and Wave Propagation in Layered Media: Band Structure, Scattering, and Homogenization  <i>Vahidreza Alizadeh*, Alireza Amirkhizi</i>	Machine Learning Model for Phase-Field Informed Crystal Plasticity Shape Memory Alloy Effect  <i>Jobin Joy*, Pawan Chaugule, Rajendran Harikrishnan, Jean-Briac le Graverend, Dimitris Lagoudas</i>	Phase-Field Modeling of Deformation Twinning in Polycrystalline Solids  <i>Eric Ocegueda*, Kaushik Bhattacharya</i>	
<b>#M411</b>	<b>Nonlocal Models in Continuum Mechanics: Mathematical, Computational, Machine Learning Aspects, Chair(s): Animesh Biswas</b>			
Meshfree Methods for Problems with the Integral Fractional Laplacian  <i>Yanzhi Zhang*, Yixuan Wu</i>	nPINNs: Nonlocal Physics-Informed Neural Networks  <i>Goufei Pang, Marta D'Elia, Michael Parks*, George Karniadakis</i>	A Machine-Learning Framework for Peridynamic Material Models with Physical Constraints  <i>Xiao Xu*, Marta D'Elia, John Foster</i>	Modal Operator Regression for Extracting Nonlocal Continuum Models  <i>Ravi Patel*, Nathaniel Trask, Mitchell Wood, Eric Cyr</i>	Continuity with Respect to Data and Stability due to Changes in Parameters of Nonlocal Models  <i>Nicole Buczkowski*, Mikil Foss, Michael Parks, Petronela Radu</i>
<b>#M412</b>	<b>Recent Advances in Multi-Scale, Multi-Physics Computational Methods in Heterogeneous Porous Media, Chair(s): Pania Newell</b>			
Fabric-Enriched Continuum Breakage Mechanics for Cemented Granular Materials in Surface-Reactive Environments  <i>Xianda Shen*, Giuseppe Buscarnera</i>	Computing the Effective Elasticity of Anisotropic Porous Media from X-Ray Computed Micro-Tomography Images  <i>Federico Semeraro*, Marcos Acin, Francesco Panerai, Arnaud Borner, Nagi Mansour, Jeremie Meurisse</i>	Computational and Experimental Study of Permeability Changes under Confinement in Fractured Porous Media  <i>Maria Warren*, Mario J. Martinez, Alec Kucala, James E. Bean, Scott T. Broome, Jennifer Wilson, Hongkyu Yoon</i>	Modeling the Interplay Between Deep Subsurface Pressure Perturbation, Fault Stability, Surface Deformation and Earthquake Cycles  <i>Saumik Dana*, Birendra Jha, Ahmed Elbanna</i>	



## TS 10: THURSDAY MORNING, JULY 29

10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM
<b>#M501</b>	<b>Local-to-Nonlocal and Nonlocal-to-Nonlocal Coupling Methods: Advances in Coupling Techniques and Treatment of Interfaces in Nonlocal Mechanics and Diffusion, Chair(s): Marta D'Elia</b>			
<p>How to Reduce the Surface Effect and to Apply the Boundary Conditions in 1D Peridynamic Models</p> <p><i>Ugo Galvanetto*, Francesco Scabbia, Mirco Zaccariotto</i></p>	<p>Overall Equilibrium in the Coupling of Peridynamics and Classical Continuum Mechanics</p> <p><i>Greta Ongaro, Pablo Seleson*, Ugo Galvanetto, Tao Ni, Mirco Zaccariotto</i></p>	<p>A Study of Wave Propagation of Coupling Nonlocal and Local Elasticities</p> <p><i>Xingjie Li*, Hayden Pecoraro, Pablo Seleson, Kelsey Wells</i></p>	<p>Seamless Coupling of Nonlocal and Local Energies via Varying Horizons</p> <p><i>Xiaochuan Tian*</i></p>	<p>An Asymptotically Compatible Treatment of Traction Loading in Linearly Elastic Peridynamic Fracture</p> <p><i>Yue Yu*, Huaiqian You, Nathaniel Trask</i></p>
<b>#M505</b>	<b>Computational Design of Architected Materials, Chair(s): Julián Norato, Xavier Oliver</b>			
<p>Sensitivity and Uncertainty Quantification Analysis in Phononic Metamaterials through Complex-Variable Finite Element Method</p> <p><i>Juan David Navarro, Matthew Balcer, Harry Millwater, David Restrepo*</i></p>	<p>Modeling Failure Mechanisms of Topologically Interlocked Structures</p> <p><i>Shai Feldfogel*, David Kammer</i></p>	<p>Latent Variable Model and Data-Driven Design of Metamaterials: A New Synthesis</p> <p><i>Liwei Wang*, Yu-Chin Chan, Anton van Beek, Daicong Da, Faez Ahmed, Ping Zhu, Wei Chen</i></p>	<p>Homogenization-Based Optimization of Lattice Structures Using Granular Micromechanics Approach</p> <p><i>Yahaira Corona*, Ranganathan Parthasarathy</i></p>	
<b>#M506</b>	<b>Materials Response to Extreme Conditions, Chair(s): Marisol Koslowski</b>			
<p>Radiation Damage study of Ni/Inconel Multimetallc Layered Composite for Fluoride-Salt Reactor - A Molecular Dynamics study</p> <p><i>Shiddartha Paul*, Daniel Schwen, Michael Short Short, Kasra Momeni</i></p>	<p>Stress Fields, Plastic Flow, Contact Friction, and Strain-Induced Phase Transformations in Zr in Traditional and Rotational Diamond Anvils: Coupled Computational and Experimental Approaches</p> <p><i>Achyut Dhar*, K.K Pandey, Valery Levitas</i></p>	<p>Nanoscale Investigation of Shock Wave Propagation Through Amorphous Polymers and Their Interfaces with Hard Materials</p> <p><i>Nuwan Dewapriya*, Ronald Miller</i></p>	<p>An Efficient Implementation of Elastodynamics into Three-Dimensional Discrete Dislocation Dynamics Simulation of Finite Volumes</p> <p><i>Junjie Yang*, Yejun Gu, Tamer Zaki, Jaafar El-Awady</i></p>	<p>Efficient Hydrocode Modeling of Airblast Propagation at Large Scaled Ranges</p> <p><i>Jesse Sherburn*, Genevieve Pezzola, Catherine Stephens</i></p>

## TS 10: THURSDAY MORNING, JULY 29

10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM
<b>#M512</b>	<b>Fiber Network Materials: Multiphysics and Multiscale Analysis, Chair(s): Jaan-Willem Simon</b>			
<p><b>Keynote presentation:</b> Modeling the Fracture Behavior of Fiber Networks Using Discrete Element Method</p> <p><i>Yujun Li*, Jiao Huang, Xing Chen</i></p>	<p>Data-Driven Microstructure Sensitivity Study of Fibrous Paper Materials</p> <p><i>Binbin Lin*, Bai-Xiang Xu</i></p>	<p>How to Capture Centimeter-Scale Local Variations in the Pore Space of Paper: A Benchmark Study Using <math>\mu</math>-CT</p> <p><i>Matthias Neumann, Eduardo Machado Charry, Ekaterina Baikova, André Hilger, Ulrich Hirn, Ingo Manke, Volker Schmidt, Karin Zojer*</i></p>		
<b>#M601</b>	<b>Industrial Applications of IGA, Chair(s): Xiaodong Wei</b>			
<p>Geomiso ISA: A Cloud-Based Software for Static Isogeometric Analysis with Plate Elements</p> <p><i>Panagiotis Karakitsios, Konstantinos Gogos*, Konstantinos Mprellas</i></p>	<p>Goal-Adaptive Meshing for Structural Shell Analysis Problems</p> <p><i>Hugo Verhelst*, Matthias Möller, Henk Den Besten</i></p>	<p>Mesh Generation and NASA's CFD Vision 2030</p> <p><i>John Chawner*</i></p>		
<b>#M611</b>	<b>Waves: Advanced Numerical Methods and Applications, Chair(s): Robert Haber</b>			
<p>A Stable Immersed Discontinuous Galerkin Method for Wave Propagation in Heterogeneous Acoustic Elastic Media</p> <p><i>Slimane Adjerid, Haroun Meghaichi*</i></p>	<p>Parallel Space-Time Multilevel Methods with Application to Electrophysiology</p> <p><i>Pietro Benedusi*, Patrick Zulian, Rolf Krause, Carlo Garoni, Stefano Serra-Capizzano, Michael Minion</i></p>	<p>Formulation and Stability Analysis of Unstructured Spacetime Discontinuous Galerkin Method for Hyperbolic and Parabolic Partial Differential Equations</p> <p><i>Giang Huynh*, Reza Abedi, Robert Haber</i></p>	<p>Computing Leaky Modes of Optical Fibers Using a FEAST Algorithm for Polynomial Eigenproblems</p> <p><i>Benjamin Parker*, Jay Gopalakrishnan, Pieter VandenBerge</i></p>	

## TS 10: THURSDAY MORNING, JULY 29

10:00 AM	10:20 AM	10:40 AM	11:00 AM	11:20 AM
<b>#M615</b>	<b>Image Processing, Discretization, and Simulation of As-Built Geometries, Chair(s): David Noble</b>			
<p>Quantifying the Unknown: Impact of Segmentation Uncertainty on Image-Based Simulations</p> <p><i>Michael Krygier*, Tyler LaBonte, Carianne Martinez, Chance Norris, Krish Sharma, Lincoln Collins, Partha Mukherjee, Scott Roberts</i></p>	<p>Computational Analysis of the Effects of Geometric Irregularities and Post-Processing Steps on the Mechanical Behavior of Additively Manufactured 316L Stainless Steel Stents</p> <p><i>Lisa Wiesent*, Ulrich Schultheiß, Philipp Lulla, Thomas Schratzenstaller, Christof Schmid, Aida Nonn, Ashley Spear</i></p>	<p>Autonomous Microstructural Feature Characterization of Additively Manufactured Metals Using an Optimized Machine Learning Framework</p> <p><i>Roberto Perera*, Vinamra Agrawal, Davide Guzzetti</i></p>		
<b>#M616</b>	<b>Phase-Field Modeling and Simulation in Computational Mechanics, Chair(s): Yu Leng</b>			
<p>Mechano-Chemical Modeling of Microstructure Evolution and Grain Size Stabilization in Nano-Crystalline Metallic Alloys</p> <p><i>Prakarsh Pandey*, Shiva Rudraraju</i></p>	<p>Isogeometric Analysis of Cahn-Hilliard Phase Field-Based Binary-Fluid-Structure Interaction Based on an ALE Variational Formulation</p> <p><i>Babak Sayyid Hosseini*, Stefan Turek, Matthias Möller</i></p>	<p>A Variational Interface-Preserving and Conservative Phase-Field Method for the Surface Tension Effect in Two-Phase Flows</p> <p><i>Xiaoyu Mao*, Vaibhav Joshi, Rajeev Jaiman</i></p>	<p>A Unified Phase Field Approach to Elastic-Plastic Fracture</p> <p><i>Pietro Pascale*, Kumar Vemaganti</i></p>	<p>Using Multi-phase Cahn-Hilliard-Navier-Stokes Models to Extract Interfacial Properties of Molten Metal Mixtures</p> <p><i>Ali Rabeih*, Makrand Khanwale, Jonghyun Lee, Baskar Ganapathysubramanian</i></p>
<b>#M618</b>	<b>Enriched Finite Element Methods and Non-Intrusive Coupling Algorithms, Chair(s): Armando Duarte</b>			
<p><b>Keynote presentation:</b> Non-Intrusive Coupling of a 3D Multi-Scale Generalized Finite Element Method with a Commercial FE Solver</p> <p><i>Haoyang Li, Patrick O'Hara*, C. Armando Duarte</i></p>	<p>Iterative Global-Local Algorithm for Coupling 3D Solid and Shell Models</p> <p><i>Javier Avecillas Leon*, Haoyang Li, Armando Duarte</i></p>	<p>Recent Developments and Numerical Experiments Regarding Recovery Strategies, a Posteriori Error Estimation and Adaptivity for the GFEM</p> <p><i>Murilo Bento*, Caio Ramos, Sergio Proença</i></p>		

## TS 11: THURSDAY AFTERNOON, JULY 29

11:50 AM	12:10 PM	12:30 PM	12:50 PM	1:10 PM	1:30 PM
<b>#M203</b>	<b>Cell-Scale Mechanics, Tissue-Scale Mechanics and Mechanobiology, Chair(s): Johannes Weickenmeier</b>				
<p>Collagen Density Regulates Tumour Spheroid Growth through Cell Motility</p> <p><i>Inês G. Gonçalves*, Jose Manuel García-Aznar</i></p>	<p>Hyperelastic Material Properties of Brain Myelinated Axons</p> <p><i>Poorya Chavoshnejad*, Mir Jalil Razavi</i></p>	<p>A 3D Agent-Based Model to Explore DIPG Cells Invasion in Different-Stiffness Matrices</p> <p><i>Daniel Camacho-Gómez*, José Manuel García-Aznar, María José Gómez-Benito</i></p>			
<b>#M205</b>	<b>Growth and Remodeling of Living Tissues, Chair(s): Adrian Buganza Tepole</b>				
<p>Mechanics of Brain Folding: Interplay of Differential Growth and Axonal Tension</p> <p><i>Poorya Chavoshnejad, Mir Jalil Razavi*</i></p>	<p>Is Heterogeneous Cortical Growth Necessary to Recapitulate Cortical Thickness Patterns Seen in the Brain?</p> <p><i>Shuolun Wang*, Nagehan Demirci, Maria Holland</i></p>	<p>Towards Predicting the Progression of Osteoarthritis within a Framework of Volumetric Growth and Remodeling</p> <p><i>Muhammed M. Rahman, Thomas S. E. Öst, Corey P. Neu, David M. Pierce*</i></p>	<p>A Model for 3D Deformation and Reconstruction of Contractile Microtissues</p> <p><i>Jaemin Kim, Erik Mailland, Selman Sakar, Nikolaos Bouklas*</i></p>		
<b>#M304</b>	<b>Recent Advances in Data-Driven Scientific Model Development and Recovery, Chair(s): Alireza Doostan</b>				
<p>Active Importance Sampling for Efficient Surrogate Modeling of Unit Operations in the Biochemical Conversion Process</p> <p><i>Andrew Glaws*, Hariswaran Sitaraman, Jonathan Stickel, Ethan Young</i></p>	<p>Continuous Modal Bases for Parameter-Varying Dynamical Systems</p> <p><i>Nicholas Hamilton*</i></p>	<p>Nonlinear Strategies for Recovering Governing Equations from Noisy Data</p> <p><i>Alexandre Cortiella, Hee-Sun Choi, Jeffrey Hokanson*, Alireza Doostan</i></p>			



## TS 11: THURSDAY AFTERNOON, JULY 29

11:50 AM	12:10 PM	12:30 PM	12:50 PM	1:10 PM	1:30 PM
<b>#M322</b>	<b>Robust and Verifiable Data-Driven Analysis and Design Using Machine Learning, Chair(s): Vahid Keshavarzzadeh</b>				
Sequential Decision Making for Adaptive Time Stepping in Solving Nonlinear Differential Equations  <i>Ramakrishna Tipireddy*, William Rosenthal, Vinay Amatya</i>	Physics-Informed Machine Learning Method for Large-Scale Data Assimilation Problems with Application to Groundwater Modeling at the Hanford Site  <i>Yu-Hong Yeung*, David Barajas-Solano, Qizhi He, Alexandre Tartakovsky</i>	Intelligent Crack Growth Monitoring Using an Internet of Things Approach  <i>Sarah Malik*, Emine Tekerek, Abrar Zawad, Antonios Kontsos</i>	Accurate NDT Characterization of Hidden Flaws with Mechanics and Machine Learning  <i>Sijun Niu*, Vikas Srivastava</i>		
<b>#M410</b>	<b>Multi-Scale and Multi-Physics Computations in Fluids and Solids, Chair(s): Glaucio Paulino</b>				
Controlling Frontal Polymerization with Phase-Changing Materials  <i>Yuan Gao*, Mason Dearborn, Aditya Kumar, Sagar Vyas, Julie Hemmer, Zhao Wang, Aaron Esser-Kahn, Philippe Geubelle</i>	Development of a One-Dimensional CAC Framework to Model Long-Time Shock Wave Propagation  <i>Alexander Davis*, Vinamra Agrawal</i>	Probing Sea Ice Mechanics with a Lagrangian Discrete Element Model for Sea Ice  <i>Svetoslav Nikolov*, Kara Peterson, Adrian Turner, Dan Bolintineanu, Joel Clemmer</i>	Multiphase Lattice Discrete Particle Model for the Prediction of Early-Age Properties of Cement Paste  <i>Elham Ramyar*, Gianluca Cusatis</i>	Grain-Scale Modeling of Thermal and Mechanical Cycling of Coarse-Grain SAC305 Solder Joints  <i>Qian Jiang*, Abhishek Deshpande, Abhijit Dasgupta</i>	
<b>#M411</b>	<b>Nonlocal Models in Continuum Mechanics: Mathematical, Computational, Machine Learning Aspects, Chair(s): Michael Parks</b>				
Convergence of the TFDW Energy to the Liquid Drop Model  <i>Lorena Aguirre Salazar, Stan Alama*, Lia Bronsard</i>	Nonlocal Frameworks: Operators and Convergence  <i>Petronela Radu*</i>	Chemically-Driven Fracture in Porous Media: A Phase-Filed Fracture Study  <i>Pania Newell*, Louis Schuler</i>	Tempered Fractional Laplacian in the Nonlocal Framework  <i>Hayley Olson*, Mikil Foss, Petronela Radu, Marta D'Elia, Mamikon Gulian</i>		

## TS 11: THURSDAY AFTERNOON, JULY 29

11:50 AM	12:10 PM	12:30 PM	12:50 PM	1:10 PM	1:30 PM
<b>#M422</b>	<b>Novel Simulation Techniques for Deforming-Domain Problems, Chair(s): Marek Behr</b>				
<p>Computational and Experimental Analyses of Blade Coating</p> <p><i>Hyungjoo Yim, Junmo Lee, Jaewook Nam*</i></p>	<p>Interfacial Multiphysics Using an ALE Interface-Tracking Method</p> <p><i>Holger Marschall*, Heba Alkafri, Chiara Pesci, Andre Weiner, Dieter Bothe</i></p>	<p>Space-Time Finite Element Methods in Moving Domains</p> <p><i>Olaf Steinbach*, Peter Gangl, Mario Gobrial</i></p>	<p>Space-Time Simulation of a Heaving and Pitching Foil with Time Periodicity</p> <p><i>Jacob Lotz*, Marco ten Eikelder, Ido Akkerman</i></p>	<p>Dynamic Mode Decomposition for AMR/C Fluid Flow Simulations</p> <p><i>Gabriel F. Barros*, Malú Grave, Alex Viguerie, Alessandro Reali, Alvaro L. G. A. Coutinho</i></p>	<p>Space-Time Meshes in Droplet Formation and Detachment During GMA Welding</p> <p><i>Violeta Karyofylli*, Marek Behr</i></p>
<b>#M512</b>	<b>Fiber Network Materials: Multiphysics and Multiscale Analysis, Chair(s): Karin Zojer</b>				
<p>Embedded Discontinuity Finite Element Method (ED-FEM) for Modeling Fiber Failures in Random Fiber Networks</p> <p><i>Vedad Tojaga*, Artem Kulachenko, Sören Östlund</i></p>	<p>Modeling the In-Plane and Out-Of-Plane Mechanical Response of Paper Using Fiber Networks</p> <p><i>Greta Kloppenburg, Hagen Holthusen, Jaan-Willem Simon*</i></p>	<p>Paper Straw Development by Virtual Modelling, Physical Testing Combined with Virtual Testing</p> <p><i>Eskil Andreasson*, Tommy Lindström</i></p>			
<b>#M612</b>	<b>Minisymposium on Computational and Numerical Differentiation and its Application to Engineering Analysis, Chair(s): Manuel Garcia</b>				
<p>A Hypercomplex-Variable Finite Element Method-Based Inverse Methodology to Extract Constitutive Parameters Using Experimental Data</p> <p><i>Daniel Ramirez Tamayo*, Ayoub Soulami, Varun Gupta, Arturo Montoya, Harry Millwater</i></p>	<p>Solution of Ordinary Differential Equations Using Hypercomplex Numbers with Applications to Fracture Mechanics</p> <p><i>Mauricio Aristizabal, Manuel Garcia*, Harry Millwater</i></p>	<p>An Efficient Approach to Solve the System of Equations of Hypercomplex Finite Element Methods Using a Block Forward Substitution Scheme</p> <p><i>Andres M. Aguirre-Mesa*, Manuel J. Garcia-Ruiz, Mauricio Aristizabal, David Wagner, Daniel Ramirez-Tamayo, Arturo Montoya, Harry Millwater</i></p>			

## TS 11: THURSDAY AFTERNOON, JULY 29

11:50 AM	12:10 PM	12:30 PM	12:50 PM	1:10 PM	1:30 PM
<b>#M613</b>	<b>Enabling Rapid Design-to-Analysis for Agile Workflows, Chair(s): Jacob Koester</b>				
<p>An Optimization-inspired Solver for Inequality Constrained Nonlinear Solid Mechanics Applied to Frictional Contact, Buckling, and Phase-field Fracture</p> <p><i>Michael Tupek*, Brandon Talamini</i></p>	<p>Fault-Tolerant Meshing Workflow in ANSYS Fluent</p> <p><i>Chenglong Wang*, Nagendra Gannamanedi, Hamid Ghazialam, Elijah Gravenhorst</i></p>	<p>Regression Based Approach for Robust Finite Element Analysis on Arbitrary Grids (REBAR)</p> <p><i>Paul Kuberry*, Pavel Bochev, Jacob Koester, Nathaniel Trask</i></p>	<p>Explicit VMDG: Synchronous and Concurrent Parallel Solution in Multi-Domain Problems</p> <p><i>Marcelino Anguiano*, Paul Kuberry, Pavel Bochev, Arif Masud</i></p>	<p>Robust Finite Element Method on Poor Grids via Discontinuous Galerkin Stabilized Meshfree Approximation: Fast Implementation and Theory</p> <p><i>Quang-Thinh Ha*, Paul Kuberry, Paul Barbone, Nathaniel Trask</i></p>	