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COMPUTATIONAL MODELING OF NATURAL AND MANMADE DISASTERS

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ABSTRACT

Extreme events that occur as the result of manmade and natural disasters (blast, impact and penetration, earthquake, tsunami, landslide) pose severe threats to our society's well-being. As such, computational analyses coupled with purpose-designed experimental verification and validation (V&V) are crucial to predict, understand and mitigate these complex events; research in this area is essential for the safeguarding of the manmade and natural environment. This session aims to promote collaboration among academia, government, and industry engineers in the development and application of advanced computational and experimental methods for the study of extreme events. Those working in the fields of computational solid mechanics, fluid dynamics and fluid-structure interaction, constitutive model development, material characterization, and other computational and/or experimental methods related to the prediction and analysis of extreme events are cordially invited to exchange their ideas and research results in this session. The minisymposia will solicit all subjects related to computational modeling and related experimental V&V for the study of extreme events, which include, but are not limited to, the following:

- Method and algorithm development for the simulation of problems involving harsh dynamic loading, high strain-rate, large material deformation, fracture and failure, or material breakup

- Fluid dynamics and fluid-structure interaction in disaster-driven material and structure failures

- Constitutive modeling and characterization of materials under high pressure and strain rate

- Constitutive modeling and characterization of disaster debris fields
- Simulation of multi-phase flow fields resulting from disaster events
- Modeling of high strain rate response in solids and structures
- Modeling of shocks in solids, fluids, and shock induced fluid-structure interaction
- Applications of computational methods to simulation of natural and manmade disasters
- Computational investigations on infrastructure resiliency to include predictions of residual strength and prevention of progressive collapse
- Computational and experimental investigations on material high-rate damage and failure mechanisms
- Computational and experimental investigations on soil liquefaction, foundation failure and debris flow
- Verification and validation of disaster simulation models
- Numerical algorithm implementation and simulation software development