ADVANCES AND APPLICATIONS IN MESHFREE, PARTICLE, AND PERIDYNAMIC METHODS

JS Chen[1] and Frank Beckwith[2] and Zhen Chen[3] and Sheng-Wei Chi[4] and Michael Hillman[5] and Tsung-Hui Huang[6] and Marc Alexander Schweitzer[7] and Pablo Seleson[8] and Cheng-Tang Wu[9]*

[1]*University of California, San Diego, USA*
[2]*Sandia National Laboratories, USA*
[3]*University of Missouri, USA*
[4]*University of Illinois, Chicago, USA*
[5]*Karagozian & Case Inc, USA*
[6]*National Tsing-Hua University, Taiwan*
[7]*Fraunhofer SCAI & University of Bonn, Germany*
[8]*Oak Ridge National Laboratory, USA*
[9]*ANSYS Inc, USA*

MINISYMPOSIUM

Meshfree, particle, and peridynamic methods offer a new class of numerical methods that play an increasingly significant role in the study of challenging engineering and scientific problems. New and exciting developments of these methods often go beyond the classical theories, incorporate more profound physical mechanisms, and become the exclusive numerical tools in addressing the computational challenges that were once difficult or impossible to solve by conventional methods.

The goal of this minisymposium is to bring together experts working on these methods, share research results, and identify the emergent needs towards more rapid progress in advancing the important fields of meshfree, particle, and peridynamic methods. Topics of interest for this minisymposium include, but are not limited to the following:

- Recent advances in meshfree, particle, and peridynamic methods, and their coupling with other computational methods such as IGA, material point method, and finite element method
- Immersed approaches for non-body-fitted discretizations
- Enrichment of basis functions for non-smooth approximations
- Integration of physics-based and data-enabled approaches
- Enhancement of meshfree, particle, and peridynamic methods by machine learning algorithms
- Strong form collocation methods
- Stabilization for under-integrated Galerkin methods
- Methods for coupling multiple physics and/or multiple scales
- Parallel computation, solvers, and large-scale simulations
- Recent advances for challenging industrial applications: modeling extreme loading events, additive manufacturing, and mitigating disasters
- Methods enabling a rapid design-to-analysis workflow