Extended/generalized FEM and other partition of unity based methods

C. Armando Duarte, *University of Illinois at Urbana-Champaign*

Ted Belytschko, *Northwestern University*

Angelo Simone, *Delft University*

NataraJan Sukumar, *University of California, Davis*

Extended or Generalized Finite Element Methods have received increased attention and undergone substantial development during the last decade. These methods offer unprecedented flexibility in the construction of shape functions and corresponding approximation spaces. With the proper selection of enrichment functions, this class of methods is able to address many shortcoming and limitations of the classical FEM while retaining its attractive features. Meshfree approximations can also be built within this framework using, e.g., partition of unity functions like Shepard functions, moving least squares functions, entropy shape functions, and many instances of radial basis functions.

This mini-symposium aims at bringing together engineers, mathematicians, computer scientists, and national laboratory and industrial researchers to discuss and exchange ideas on new developments, mathematical analysis, and application of the Extended/Generalized Finite Element Method and other partition of unity methods. While contributions in all aspects of these methods are invited, some of the topics to be featured are

. Identification and characterization of problems where Extended/Generalized Finite Element, and related methods have clear advantage over classical approaches;
. Applications, including but not limited to, multi-scale and multi-physics problems, dislocations, polycrystals, jointed rocks, masonry, composite and other advanced materials, biological materials;
. Time-dependent problems and stability analysis;
. Mathematical theory;
. Higher-order Extended/Generalized Finite Element Methods;
. Implicit and explicit representation of moving interfaces using level sets and other techniques;
. Imposition of boundary conditions;
. Numerical quadrature for partition of unity approximations;
. Solution of system of equations arising from this class of methods.