PUMA: A RAPID ENRICHED SIMULATION DEVELOPMENT FRAMEWORK – EFFICIENCY & SCALABILITY THROUGH OPTIMAL ENRICHMENTS

WEDNESDAY OCTOBER 4, 12 PM – 12:50 PM

LOCATION: CENTER HALL 214

Abstract:

In this talk, the Partition of Unity Method (PUM) and its implementation in Fraunhofer SCAI's PUMA software framework will be presented. The fundamental idea and benefit of the PUM is to reduce the necessary number of degrees of freedom of a simulation while attaining the required accuracy of the application by using application-dependent enrichment functions which can resolve highly localized behavior of the solution instead of using mesh-refinement and standard piecewise polynomial basis functions. This talk will show how such application-dependent enrichments can be constructed *a priori* and on-the-fly during a simulation with examples such as laminated composites, shells and additive manufacturing problems.

Speaker Biography:

Professor Schweitzer earned his doctoral degree in Mathematics from the University of Bonn in 2002. He is professor of Mathematics at the Institute for Numerical Simulation, University of Bonn, and Department Head of Numerical Software at Fraunhofer Institute for Algorithms and Scientific Computing SCAI. He has been the Managing Director of the Institute for Numerical Simulation at the University of Bonn since 2016, and Deputy Director of Fraunhofer SCAI since 2020. His research interests include numerical methods for PDE, meshfree methods, multilevel solvers, multiscale applications, and high-performance computing.

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