

Society of Engineering Science 51st Annual Technical Meeting

1–3 October 2014

Purdue University, West Lafayette, Indiana, USA

An interface-enriched generalized finite-element method for efficient electromagnetic analysis of composite materials

Zhang, Kedi, kzhang18@illinois.edu; Najafi, Ahmad Raeisi; Jin, Jian-Ming; Geubelle, Philippe H.,
University of Illinois at Urbana-Champaign, United States

ABSTRACT

An interface-enriched generalized FEM is presented for analyzing electromagnetic problems involving composite materials. To avoid of generating conformal meshes in highly inhomogeneous domains, enriched vector basis functions are introduced over the intersections of material interfaces and the nonconforming elements to capture the normal derivative discontinuity of the tangential field component. These enrichment functions are directly constructed from a linear combination of the vector basis functions of the subelements. Several numerical examples are presented to verify the algorithm with analytical solutions and demonstrate its h-refinement convergence rate. Finally, two illustrative examples, involving multiple microvascular channels and circular inclusions, are solved.