A CONVERGENT ADAPTIVE ELEMENT FREE GALERKIN ALGORITHM BASED ON THE BACKGROUND MESH

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The Element Free Galerkin (EFG) method may be regarded as an alternative to the finite element method especially for problems with discontinuities, e.g. crack propagation problems. The EFG method differs from the FEM by using the Moving Least Squares (MLS) approximation. In practical implementations, EFG formulation requires a background mesh for domain integration. We present an adaptive procedure based on background mesh for meshless methods using MLS. It comprises a cell energy error estimate and a local domain refinement technique. The error estimate differs from conventional pointwise approaches in that it evaluates error based on individual cells instead of points. In this technique, each node is assigned a scaling factor to control local nodal density and achieve high efficiency in domain refinement. Refinement of the neighborhood of a node is accomplished simply by adjusting its scaling factor.

During the talk, some challenging problems will be discussed to show that the proposed adaptive procedure is effective, efficient and convergent. The limitations of the approach will also be mentioned.