Proceedings of the 19th UK Conference of the
Association for Computational Mechanics in Engineering
5 - 6 April 2010, Heriot-Watt University, Edinburgh

ENHANCED RECOVERY TECHNIQUES FOR ACCURATE EVALUATION OF ERROR ESTIMATES IN FEM/XFEM

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Key Words: *error estimation; FEM; XFEM; recovery; fracture mechanics*

ABSTRACT

When modelling critical structures, it is crucial to rationally assess the outcome of numerical simulations. Specifically, error estimation strategies are key tools in critical decision-based processes. The development of design tools that enhance performance of the final product and give reliability on the calculations is essential in today's industrial environment, which increasingly seeks to reduce development times for new products while improving the quality.

During the last years there has been an increasing interest on the use of error estimates which help to measure and control the error committed in standard or enriched finite element approximations. The error can be defined in terms of energy norm or in quantities of interest relevant for design purposes (such as the mean stress value in a particular area, displacements, the stress intensity factor for fracture problems,...).

In this work, we discuss the use of different a posteriori recovery techniques to evaluate error estimates in energy norm or quantities of interest for FEM/XFEM approximations. These techniques are based on equilibrated superconvergent patch recovery or equilibrated moving least squares procedures and can be used in smooth or singular problems. Numerical results show the capabilities of the proposed techniques to provide good error estimates.

References

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