TAMPERE UNIVERSITY OF TECHNOLOGY

Visiting lecture

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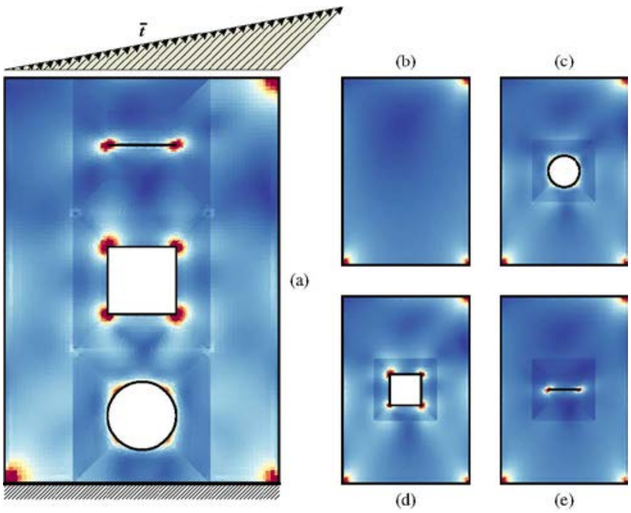
Enhanced-strain error estimation procedures in Galerkin mesh-based and meshfree methods

Wednesday 28.2.2018 at 14.15-15.00 in lecture hall RH201

Abstract
The finite element method enjoys tremendous popularity in virtually all fields of engineering and applied mathematical sciences. However, certain shortcomings cannot be denied, e.g. its inability of dealing with arbitrary crack-propagation problems, which goes along with being tied to a mesh, the construction of which can be a tedious task. Meshfree methods cope with these problems and introduce new types of shape functions into the Galerkin method. As the name implies, the scattered particles in combination with arbitrary support sizes of the associated shape functions naturally bypass the construction of a mesh.

Every Galerkin method generally leads to an error, known as discretization error. In this presentation, emphasis is therefore placed on error estimation procedures that can be applied to Galerkin mesh-based and meshfree methods. The error estimators rely on a nodal integration scheme well known as stabilized conforming nodal integration (SCNI). This integration scheme can be established within the variational framework of the enhanced assumed strain (EAS) method. It is demonstrated how the discretization error can be controlled a posteriori in terms of novel computable error estimators that are easy to implement and provide either error bounds or sharp error approximations without bounds.

The presentation includes numerical examples of engineering interest, which illustrate the performance of the a posteriori error estimators presented for both Galerkin mesh-based and meshfree methods.



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