

CIVIL ENGINEERING SEMINAR

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A401 – School of Engineering



Three-dimensional brittle fracture: configurational-force-driven crack propagation

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ABSTRACT

Fracture is a pervasive problem in materials and structures and predictive modelling of crack propagation remains one of the most significant challenges in solid mechanics. A computational framework for modelling crack propagation must not only be able to predict the initiation and the direction of cracks but also to provide a numerical setting to accurately resolve the crack path.

A computational framework is presented for quasi-static brittle fracture in three-dimensional solids. The theory for determining the initiation and direction of propagating cracks is based on the concept of configurational mechanics, consistent with Griffith's theory. Resolution of the propagating crack by the finite element mesh is achieved by restricting cracks to element faces and adapting the mesh to align it with the predicted crack direction. A local mesh improvement procedure is developed to maximise mesh quality in order to improve both accuracy and solution robustness and to remove the influence of the initial mesh on the direction of propagating cracks.

ABOUT THE SPEAKER

Dr Mohad Mousavi-Nezhad was appointed as an assistant professor in Civil engineering at the University of Warwick in June 2013. Prior to joining Warwick She worked as a postdoctoral research associate at computational mechanics group of the University of Glasgow, on an EDF Energy funded project (2011-2013). She obtained her PhD in computational geomechanics from the University of Exeter. Also, She was a visiting researcher at geotechnical group of the University of Cambridge (2009-2010). She has extensive experience on model development, numerical implementation and high performance computing based simulations of solid material deformation and fluid flow problems, with over 15 publications in these fields.

This seminar is open to all and refreshments are provided. For more information, contact Dr Stefano Utili by email at s.utili@warwick.ac.uk



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