



**UNSW**  
THE UNIVERSITY OF NEW SOUTH WALES

## DEPARTMENT OF APPLIED MATHEMATICS APPLIED SEMINAR SERIES 2007

*The Seminar Series of the Department of Applied Mathematics, UNSW, Sydney is dedicated to the announcement, dissemination and discussion of research in mathematics and its applications. A fundamental aim of the Seminar Series is to feature lectures that inform in a manner that makes the subject accessible to the audience, including non-specialists.*

**SPEAKER:** Professor Ernst P. Stephan, Institute for Applied Mathematics, University of Hannover, Germany.

**TITLE:** Efficient numerical methods with finite elements and boundary elements for multibody contact problems with friction.

**Abstract:** Firstly, we consider frictional contact for elastic bodies and introduce two boundary element methods (BEM) for the numerical solution based on pure boundary integral formulations together with corresponding automatic mesh refinement procedures. One method uses a penalty formulation which leads to a variational equation whereas the other one uses the mortar projection leading to a variational inequality, allowing for non-matching meshes. We give a posteriori error estimates for the  $h$ -version BEM for the first method, and for the  $hp$ -version BEM of the second one. Secondly, we present the finite element/boundary element (FE/BE) coupling for elasto-plastic contact problems together with an incremental loading procedure. The resulting nonlinear discrete systems are solved with Newton's method where at each iteration the radial return algorithm is used to handle plasticity and friction contact. Numerical results demonstrate the high efficiency of our approaches.

**TIME AND VENUE:** 2pm, Wednesday 21 March 2007, Room 4082, Red Centre.



*Enquiries to Dr Chris Tisdell, [cct@unsw.edu.au](mailto:cct@unsw.edu.au)*