Department of Civil Engineering and Engineering Mechanics
Columbia University

Thursday, October 27, 2011 (2:30-3:30 pm)
825 Mudd

ADVANCES IN COMPUTATIONAL LIMIT ANALYSIS

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Limit analysis provides a powerful means of estimating the maximum load sustainable by a body or structure. However, various difficulties have meant that *computational* limit analysis procedures have generally not found widespread use in engineering practice. In this presentation the methods which have proved popular with researchers to date will be briefly reviewed, and details of a relatively new and extremely promising alternative procedure, termed *discontinuity layout optimization* (DLO), will be provided. It will be demonstrated that DLO appears to overcome many of the difficulties associated with traditional methods (e.g. results from finite element limit analysis can be sensitive to the mesh arrangement around stress or displacement singularities). With DLO meshing is not required and the critical arrangement of discontinuities which inter-link nodes distributed across the body under consideration can be identified directly, using an efficient optimization procedure. DLO will be applied to a variety of problems, including plane strain geotechnical and masonry problems and also out-of-plane concrete slab problems.

Biosketch: Matthew Gilbert graduated with a first class honours degree in Civil and Structural Engineering from the University of Sheffield in 1989. He went on to study the behaviour of masonry arch bridges (awarded a PhD by the University of Manchester, 1993) before returning to the University of Sheffield, where he is currently a Senior Lecturer. He has a special interest in the development of novel computational limit analysis and design methods and currently leads the Computational Mechanics and Design Research Group at the University. He is also a chartered civil engineer and Managing Director of LimitState Ltd, a spin-out company which develops and markets limit state analysis and design software.