Séminaire de laboratoire

Numerical investigations on the mechanical response of fractured rocks

Speaker	Dr. **Dion Weatherley**, W.H. Bryan Mining and Geology Research Centre, University of Queensland (Australia)
Audience	Everyone interested in solid mechanics, materials science, computer-aided engineering, numerical modelling
Date	**Thursday**, **June 28th 2012**, **11:00 – 12:00**
Venue	Salle du Conseil, EOST, 5 rue Descartes

Abstract

Computer-Aided Engineering (CAE) has become a powerful tool for engineering structures (e.g. bridges, towers and buildings) and mechanical devices (e.g. vehicles, aircraft, machinery). The ability to analyse stress, deformation and fatigue of a proposed structure prior to construction provides valuable information to guide engineering design. In order for CAE predictions to be reliable, an appropriate constitutive model for the building materials must be selected. Constitutive models for common building materials such as wood or steel, are reliable and rigorously validated. The building material of choice in underground mining is the in-situ rock mass itself. The mechanical response of rock is not well-understood. Mining engineers currently rely upon empirical constitutive models for rock response, calibrated via qualitative schemes to classify rock mass condition. It is not surprising therefore that CAE is found to be less reliable for design of underground excavations.

Most knowledge on rock response derives from laboratory experiments, such as compression or tension tests. Such experiments have elucidated some of the key parameters influencing rock response such as porosity, mineral texture, crack density, and physical dimensions. However, in most cases it is difficult to conduct systematic control experiments to quantify the role of such parameters in determining the mechanical response of rocks. This lecture will present recent work using a numerical model for rock based on the Discrete Element Method aiming to provide fundamental insight on the interplay between the structure of rock and its mechanical response under engineering loads.

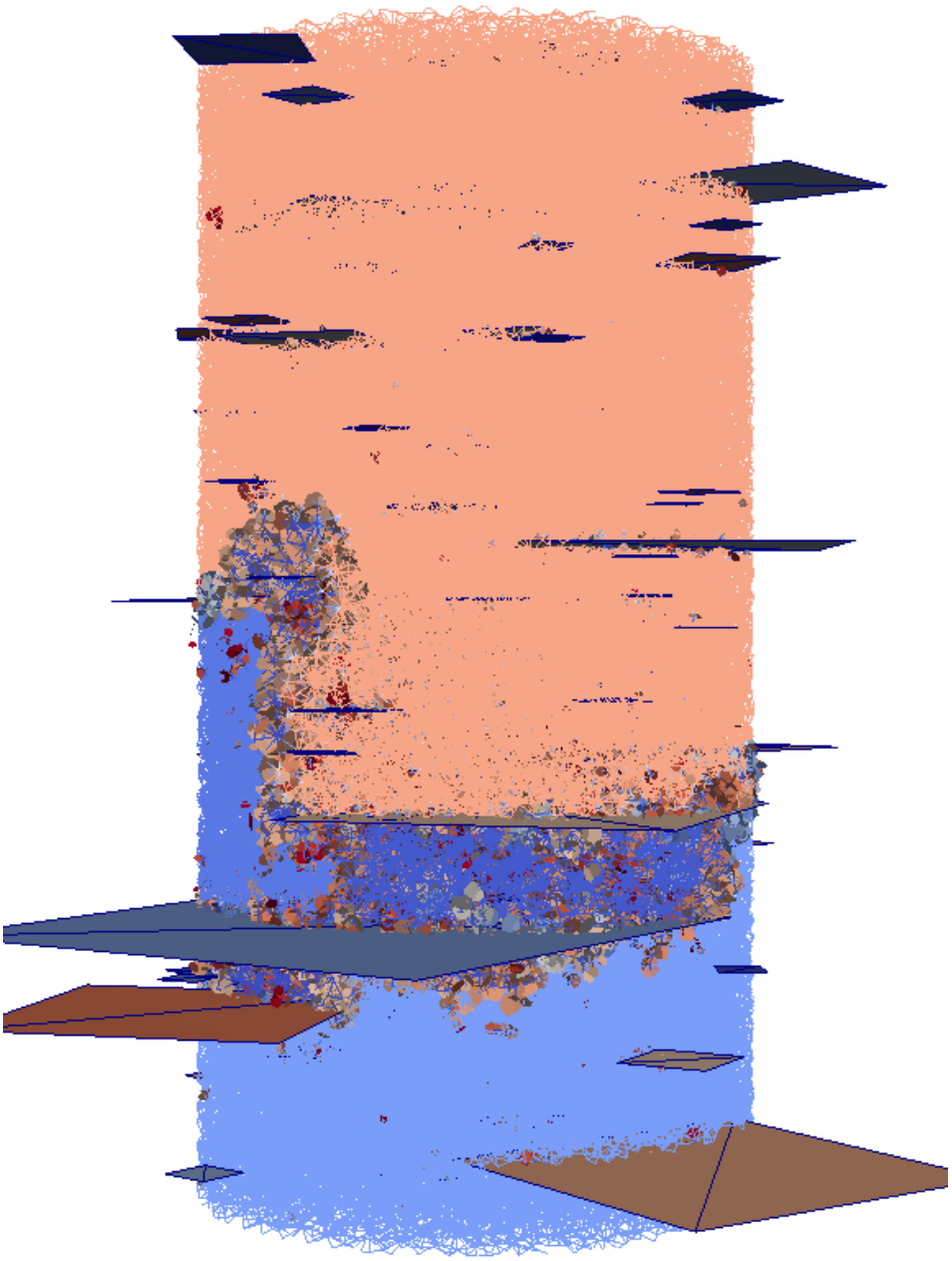

Figure: Failure of a virtual rock specimen containing pre-existing fractures under uniaxial compression. Colours delineate different rock fragments resulting from specimen failure

The language of the presentation is English
Free entrance, guests are welcome