



WORKSHOPS ARE OFFERED IN CONJUNCTION WITH THE EVENT

ROCK ENGINEERING IN DIFFICULT CONDITIONS

“3rd Canada-US Rock Mechanics Symposium” & “20th Canadian Rock Mechanics Symposium”

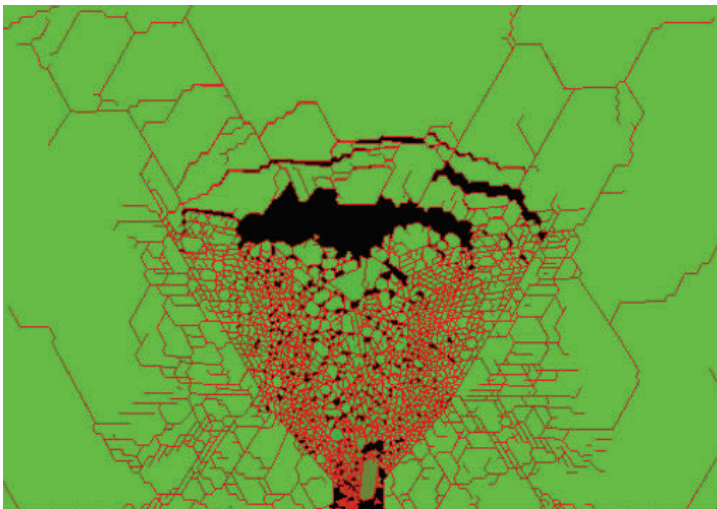
A Joint Meeting of the Canadian Rock Mechanics Association & the American Rock Mechanics Association
in Conjunction with the 2009 CIM Annual Conference and Exhibition

Combined Finite-Discrete Element Method (FEM-DEM) for Modeling Damage and Fracture in Rock

Giovanni Grasselli & Omid Khajeh Mahabadi, *University of Toronto*
Ante Munjiza, *Queen Mary - University of London*

May 15, 2009
Toronto ON, Canada

WORKSHOP FEE: \$900
MINIMUM 10 PARTICIPANTS



PROGRAM OF THE COURSE

1. Dynamic Fracture in Rock: Basic Concepts
2. Static and Dynamic Fracture Propagation in Rock
3. Introduction to Combined Finite Discrete Element Method
4. Transition from Continua to Discontinua
5. Processing of Contact Interaction in the Combined Finite Discrete Element Method
6. Sensitivity to Initial Conditions in Combined Finite-Discrete Element Simulations
7. Combined Finite-Discrete Element Simulation of Explosive Induced Fracture and Fragmentation

OBJECTIVES

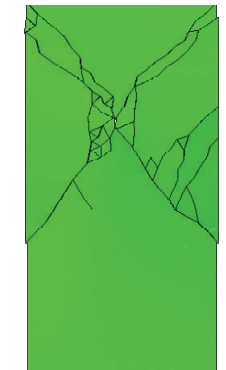
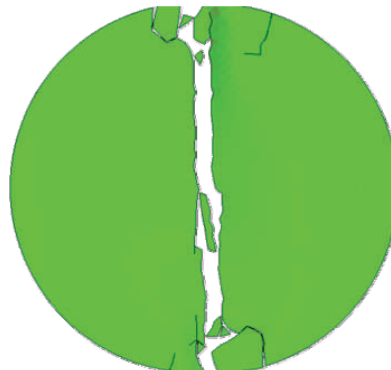
The proposed course will provide all participants with the basis of the innovative Combined Finite-Discrete Element Method (FEM/DEM) for simulating damage and fracture in geomaterials. Today the Combined Finite-Discrete Element Method is gaining increasing importance in engineering programmes and is at the forefront of current efforts in computational modelling of the failure of solids. The method has significant applications in civil, petroleum and mining engineering, rock blasting, demolition (implosion of buildings), blast loads on structures, powder technology and many more areas. It is therefore vital that students and professional engineers understand the method and know how to work with it.

The course will be structured as a collaborative effort by : Professor G. Grasselli (U. of Toronto) and Professor A. Munjiza (Queen Mary – University of London, UK). It will alternate theoretical lectures to modeling sessions where the participants will be challenged with several numerical simulations. Each participants will have the opportunity to install the FEM/DEM code on his own laptop, to build and run small numerical examples.

WHO SHOULD ATTEND:

This course will be of tremendous value for the students and professionals in Engineering Geoscience, Geology, Geophysiscs, Materials Engineering, and Solid Mechanics. All participants will be challenged not only with complex mathematical formulations, hands-on exercises and problems, but they will be also exposed to the latest version of FEM-DEM research code.

All participants will leave the course with the FEM/ DEM software and will have the possibility of joining the beta-tester group, which results in one year of free software updates.



ONE-DAY SHORT COURSE

Register at www.RockEng09.com

In case of insufficient applications (less than 5), the course may be cancelled. In that case, applicants will be informed by May 7, 2008. If the course is cancelled, then the full short course fee will be refunded.



RockEng09

BIOGRAPHY of Prof. Grasselli:

Dr. Giovanni Grasselli is a professor of Civil Engineering at the University of Toronto, Canada, and is Associate Director of the Lassonde Inst. for Eng. Geoscience. Dr. Grasselli holds an BSc in Civil Engineering (1995) from the University of Parma, Italy, and a PhD in Rock Mechanics (2001) from EPFL, Lausanne, Switzerland. His thesis "Shear Strength of Rock Joints based on Quantified Surface Description" was awarded with the 2004 ISRM Rocha Medal. He has been a research associate at Imperial College London (UK), Sandia National Labs (USA) and has served as associate director at MIRARCo (Canada). Dr. Grasselli is been involved on several researches ranging from practical rock support and ground control projects to more fundamental aspects on fluid flow and transport in porous fractured rock mass.

BIOGRAPHY of Mr. Omid Khajeh Mahabadi :

Mr. Khajeh Mahabadi is a graduate student at the University of Toronto. Omid has a MASc degree in Hydro-informatics and water management. His present graduate research focuses on the development of 3-dimensional Finite-Discrete Element Method (FEM/DEM) Code and its application to mining related projects.

BIOGRAPHY of Prof. Munjiza:

Dr. Munjiza is a pioneer in the development of FEM-DEM approach and is recognised as one of the pre-eminent experts in the field, and is director of the Virtual Experimentation Labs at QM-UL (<http://www.qmul.ac.uk/~ugex084/>). Among many other contributions, I would like to draw attention to his major role in the development of the core of the numerical code ELFEN, today the market leader for FEM-DEM codes. He is an excellent instructor and a prolific author of scientific publications on the topic of FEM-DEM. In 2004, he summarized his scientific research in the book "The Combined Finite-Discrete Element Method" that quickly has become the standard reference for FEM-DEM research.



"Rock Engineering in Difficult Conditions" is synonymous of almost any engineering activity involving rocks and rock masses.



TIME SCHEDULE:

8:30–10:15	Lectures/computer demonstrations
10:15–10:30	Coffee break
10:30–12:15	Lectures/computer demonstrations
12:15–13:15	Lunch
13:15–15:00	Lectures/computer demonstrations
15:00–15:15	Coffee break
15:15–17:00	Lectures/computer demonstrations



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