

## TABLE OF CONTENTS

Collaborating Organisations .....	iii
Technical Reviewers .....	v
International Organising Committee .....	ix
Preface .....	xi
Sponsors .....	xiii

### Fundamental and Petroleum

#### Keynote Addresses

Quantifying the Size Effect of Rock Mass Strength .....	3
<i>P.A. Cundall and M.E. Pierce, Itasca Consulting Group, USA</i>	
<i>D. Mas Ivars, Itasca Geomekanik, Sweden</i>	
Coupling Geomechanics and Transport in Petroleum Engineering .....	17
<i>M.B. Dusseault, University of Waterloo, Canada</i>	
New Insight into the Nature of Shear Rupture Propagation in Pristine Rocks and Pre-Existing Faults .....	37
<i>B.G. Tarasov, The University of Western Australia, Australia</i>	

#### Invited Speaker

Acoustic Emission Analysis of Initiation and Propagation of Faults in Brittle Rock and Compaction Bands in Porous Rock .....	69
<i>S. Stanchits, GeoForschungsZentrum Potsdam, Germany</i>	

#### Section 1: Fracture and Damage of Rocks

Effect of Grain Size and Thermo-Mechanical Properties of Minerals on Strength Reduction of Binary Ores Subjected to Microwave Radiation .....	85
<i>A.Y. Ali and S.M. Bradshaw</i>	
Rotational Mechanism of In-Plane Shear Crack Growth in Rocks Under Compression .....	99
<i>A.V. Dyskin and E. Pasternak</i>	
Ortlepp Shears – Dynamic Brittle Shears of South African Gold Mines .....	111
<i>G. van Aswegen</i>	
A Statistical Damage Constitutive Model of Brittle Rocks Based on Weibull Distribution .....	121
<i>J.G. Wang, S. Anand and F.J. Ye</i>	
Study of Subcritical Crack Growth and Long-Term Strength for Rock and Cementitious Material for Radioactive Waste Disposal .....	135
<i>Y. Nara, D. Mori, H. Owada and K. Kaneko</i>	
DEM Simulation of Rock Fragmentation and Size Distribution Under Different Loading Conditions .....	149
<i>Y.C. Wang and F. Alonso-Marroquin</i>	
Prediction of Long-Term Strength of Some Weak Rocks in Thailand .....	157
<i>K. Fuenkajorn</i>	

#### Section 2: Numerical Modelling

Assessing the Fracture of a Gravity Dam Under Earthquake Load Using a Mesh-Free Method .....	171
<i>R. Das and P.W. Cleary</i>	
Mesh Scalability Concept for Explicit Simulation of Rock Failure .....	185
<i>A.V. Dyskin and A. Caballero</i>	

Numerical Micro-Scale Modelling of Inter-Joint Swelling Pressure.....	195
<b>G.A. Narsilio, D.W. Smith, A. Mohajeri and P. Pivonka</b>	
Vibrating Screen Modelling with the Numerical Manifold Method .....	205
<b>X.M. An, J.C. Li and G.W. Ma</b>	
Wave Propagation and Attenuation Through Filled Rock Joints.....	215
<b>J.C. Li, X.M. An and G.W. Ma</b>	
Development and Geomechanical Substantiation of a Geotechnology for Rockburst-Hazardous Iron Ore Deposits in Siberia.....	229
<b>A.A. Eremenko, V.A. Eremenko, A.P. Gaidin, I.F. Matveev, G.P. Ermak and Ya.N. Baiborodov</b>	
<b>Section 3: Reservoir Mechanics</b>	
Coupled Strata and Gas Behaviour in the Co-Extraction of Coal and Methane .....	245
<b>H. Guo, D.P. Adhikary, N. Ishihara and M. Fujioka</b>	
Formation and Casing Shear During Injection and Production Activities.....	261
<b>H. Han and M.B. Dusseault</b>	
Modelling Pore Pressure/Stress Coupling .....	275
<b>B.I.R. Müller, J.B. Altmann, A. Dorner, T.M. Müller and M.R.P. Tingay</b>	
Stress Dependent Anisotropy in Shales – Measurements and Modelling .....	287
<b>M. Pervukhina, D.N. Dewhurst, U. Kuila, A.F. Siggins and B. Gurevich</b>	
Effect of Carbon Dioxide Injection on the Mechanical Properties of Synthetic Brown Coal .....	301
<b>D. Jasinge, P.G. Ranjith, S.K. Choi and J. Kodikara</b>	
Sensitivity Study of Geomechanical Effects on Reservoir Simulation.....	309
<b>L.C. Pereira, L.J.N. Guimarães and F.O.L. Falcão</b>	
<b>Section 4: Injection, Production and Fracture</b>	
Seismic Monitoring From Within the Stimulation Borehole of an Oil or Gas Reservoir.....	323
<b>M. Albrecht and V. Mansurov</b>	
Surface Weight Change Effect on Tilt Field and Hydraulic Fracture Inversion Accuracy.....	333
<b>Z.R. Chen and R.G. Jeffrey</b>	
On Intersection and Crossing of Frictional Interfaces by Hydraulic Fractures .....	347
<b>X. Zhang and R.G. Jeffrey</b>	
The Variable Rate of Sand Production Captured by an Analytical Model.....	355
<b>E. Fjær and E. Papamichos</b>	
Hydraulic Fracture Growth in Coal .....	369
<b>R.G. Jeffrey and X. Zhang</b>	
Representing a Rock Engineering System to Analyse Wellbore Instability Due to Fracture Reactivation .....	381
<b>A. Younessi and V. Rasouli</b>	
<b>Section 5: Rock Mechanics Data</b>	
Engineering Properties of Some Sedimentary Rocks at the Proposed Qomroud Tunnel Project Lot No. 7 in Iran.....	397
<b>A. Shafiei and M.B. Dusseault</b>	
Borehole Breakouts and In Situ Stresses .....	407
<b>B. Shen</b>	
Uncertainty in Rock Mass Jointing Characterisation .....	419
<b>G. Lyman, G.V. Poropat and M. Elmouttie</b>	
On the Need for Polyhedral Representation of Blocky Rock Masses.....	433
<b>M. Elmouttie, G.V. Poropat and A. Guest</b>	

Remote Characterisation of Surface Roughness of Rock Discontinuities .....	447
<b>G.V. Poropat</b>	

## **Section 6: Yielding Rock**

Rock Physics, Geomechanics and Rock Properties in Shales – Where are the Links?.....	461
<b>D.N. Dewhurst, A.F. Siggins, U. Kuila, M.B. Clennell, M.D. Raven and H.M. Nordgard-Bolas</b>	
Nonlinear Elastic Behaviour of Bushveld Rock.....	475
<b>J.S. Kuijpers, B.P. Watson and G. Henry</b>	
Evaluation of Salt Cavern Closure Via FEM Code PLAXIS.....	487
<b>G. Gjerapic and T.W. Thompson</b>	

## **Section 7: Constitutive Relationships and Effective Characteristics**

Comparison and Translation of Cap Models in Rock Mechanics .....	499
<b>P.A. Fokker</b>	
Quantitative Modelling of Granular Soils in Hypoplasticity .....	513
<b>W. Huang and D. Sheng</b>	
Revised Shear Strength Model for Soil-Infilled Rock Joints Considering Over-Consolidation Effect .....	523
<b>B. Indraratna, D.A.F. Oliveira and M. Jayanathan</b>	
The Acoustic Emission Response of Intact Quartzite Under Uniaxial Compression.....	533
<b>W.J. Darlington, P.G. Ranjith, S.K. Choi and J. Kodikara</b>	
Use of Velocity Tomography for CO <sub>2</sub> Migration Monitoring in Sedimentary Rock Formation .....	543
<b>X. Lei, Z. Xue and S. Karekal</b>	
Sliding Crack Model for the Uniaxial Stress–Strain Curve of Rock.....	553
<b>E. David, N. Brantut, A. Schubnel and R.W. Zimmerman</b>	
Determining Properties of High Compliance Porosity by Use of an Effective Medium Model Based on Crack Description in Terms of Their Normal and Shear Compliance Parameters .....	563
<b>V.Yu. Zaitsev and P. Sas</b>	
On the Determination of Rock Anisotropy for Stress Measurements.....	575
<b>P.M. Dight and A.V. Dyskin</b>	
Crystallisation Preferred Orientation in Porous Media .....	587
<b>B. Lecampion</b>	
Determination of Effective Elastic Properties of Microcracked Rocks Based on Asymptotic Approximation .....	601
<b>J.D. Zhao, S.W. Sloan and J.P. Carter</b>	

## **Section 8: Wellbore Mechanics**

A Novel Approach to Improve Wellbore Stability in Shale Through Rapid Chemoporoelastic Characterisation of Drill Cuttings .....	615
<b>A.P. Bungler and E. Detournay</b>	
Drilling Action of Roller-Cone Bits – Modelling and Experimental Validation .....	625
<b>L.F. Franca and A. Mahjoob</b>	
Constraining Pore Pressure Using Observations of Wellbore Breakouts in Shales – Case Studies in the Papua New Guinea Fold Belt Region.....	633
<b>D.A. Castillo</b>	
Author Index .....	641