# Rock Mechanics and Its Applications in Civil, Mining, and Petroleum Engineering

Selected Papers From the 2014 Geoshanghai International Congress

**Geotechnical Special Publication Number 237** 

Shanghai, China 26-28 May 2014

**Editors:** 

Lianyang Zhang

Louis N. Y. Wong

ISBN: 978-1-63266-668-0

#### Printed from e-media with permission by:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2014) by the American Society of Civil Engineers All rights reserved.

Printed by Curran Associates, Inc. (2014)

For permission requests, please contact the American Society of Civil Engineers at the address below.

American Society of Civil Engineers 1801 Alexander Bell Drive Reston, VA 20191

Phone: (800) 548-2723 Fax: (703) 295-6333

www.asce.org

#### Additional copies of this publication are available from:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571 USA

Phone: 845-758-0400 Fax: 845-758-2634

Email: curran@proceedings.com Web: www.proceedings.com

## **GSP 237 Table of Contents**

If you can read this text, your browser does not support Cascading Style Sheets. Although not essential for using this CD-ROM, you may wish to upgrade your browser to a more recent version.

#### **Keynote Presentation—Jun Sun Lecture**

1 Research in Energy Related Rock Mechanics

Herbert H. Finstein

## Theoretical and Experimental Study of Rock Behavior

5Experimental Study on Load-Unload Response Ratio (LURR) of Brittle Rocks

Fangcai Zhu and Lianyang Zhang

13Tensile Fracture Simulation in Rock Using Augmented Virtual Internal Bond Method

Yidong Wang, Zhennan Zhang, Yongfu Xu, and Yue Xi

20Study of Mechanical Properties and Fracturing Processes of Carrara Marble in Dynamic Brazilian Tests by Two Optical Observation Methods

Chunjiang Zou and Louis Ngai Yuen Wong

30 Ultrasonic Wave Velocity Response of Sandstone during Supercritical CO2 Injection

Marte Gutierrez, Daisuke Katsuki, and Abdulhadi Almrabat

40 Development of Rotary Abrasion Testing Apparatus for Rock Cores

Taegeon Lee, Gunjo Kim, and Heejung Youn

49 Dilatancy of Sandstone under Unloading and High Stress Conditions

Jian-peng Li and Qing-ke Nie

59Line Element Model for Fluid Flow in Three-Dimensional Fracture Network and Its Modification

Junqi Wang, Mao Ye, and Xiao Yue

69Numerical Simulation Study on Flow in Single Factures with Different Joint Roughness Coefficient

Guanhong He, Enzhi Wang, and Xiaoli Liu

79Study on Shear Failure Behavior of Embedded Cracks Subjected to Different Normal Stresses

D. Y. Wang, Z. N. Zhang, and X. R. Ge

89<u>Interior Strain Analysis of Red Stone Rock under Compression Using Digital Volumetric Speckle Photography</u>

Lingtao Mao, Zexun Yuan, Xiuyu Lian, and Fu-Pen Chiang

98Quantitative Analysis on Damaged Coal in Three Dimensions

Lingtao Mao, Lina Hao, Ridong Peng, and Jianchen Xu

107 <u>Vibration Source and Shock Absorption Scheme Research of Near-Field Vibration Caused by Flood Discharge and Energy Dissipation of a Stilling Pool</u>

Ronggang Yin, Jianhai Zhang, and Jianmin Zhang

### **Applications of Rock Mechanics and Case Studies**

117Studies on Water Plugging with Grouting Technique in Surrounding Rocks with Fissures of Deep Mining

Changsheng Wu, Zhiduo Zhu, Dengge Lin, and Ningning Feng

126 Rock Fracture Studies for Hill Rock Slope

R. K. Panigrahi

136A New Insight for the Effect of Strength Criterion on the Stress and Displacement around a Circular Opening

Chang-guang Zhang, Dong-hui Zhu, and Zhi Gao

143 Prediction of the Base Resistance for Drilled Shafts Socketed into Rock

Abdellatif Boucheloukh, Weiming Gong, and Guoliang Dai

154 Uniaxial Compressive Strength and Elastic Modulus of Artificial Low-Cemented Geomaterials

Mohammad Afifipour and Parviz Moarefvand

164 Rockfall Modeling Analysis and Mitigation at Mountainous Road, Saudi Arabia

Bahaaeldin Sadagah

173<u>Centrifuge Modelling of the Collapse of Shaft Linings</u>

W. Yang, A. M. Marshall, R. Stace, and D. Wanatowski

183 <u>Distribution and Forming Mechanism of Karst Collapses in Tangshan Stadium</u>

Qing-ke Nie, Jian-peng Li, Hua-wei Li, and Shu-qi Liang

191Effect of Bedrock Depth on the Lateral Behavior of Monopiles

Younggyun Choi, Geunju Kim, Osoon Kwon, and Heejung Youn

198<u>DEM Analysis of Using the Scratch Test to Probe Rock Heterogeneity</u>

Yifei Ma and Haiying Huang

208 Experimental Study on Tunnel Face Stability in Weak and Broken Rock Mass

Q. W. Xu, H. H. Zhu, W. Q. Ding, and Z. H. Tang

218An Investigation of the Limit Equilibrium Method and Numerical Modeling for Rock Slope Stability Analysis

Scott Ureel and Moe Momayez