

# **53rd US Rock Mechanics / Geomechanics Symposium 2019**

New York, New York, USA  
23-26 June 2019

Volume 1 of 6

ISBN: 978-1-5108-9406-8

**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© (2019) by the American Rock Mechanics Association  
All rights reserved.

Printed with permission by Curran Associates, Inc. (2019)

For permission requests, please contact the American Rock Mechanics Association  
at the address below.

American Rock Mechanics Association  
Peter Smeallie, Executive Director  
600 Woodland Terrace  
Alexandria, Virginia 22302-3319

Phone: (703) 683-1808  
Fax: (703) 997-6112

[info@armarocks.org](mailto:info@armarocks.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: 845-758-2633  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

## VOLUME 1

<b>3D DEM Simulation on the Interference of Multiple Hydraulic Fractures in Horizontal Wells</b> .....	1
<i>Fu, Wei ; Bungler, Andrew P.</i>	
<b>A 3D Grain-Based Model for Simulating Heterogenous Properties of Salt Rock Under Uniaxial Compression Test</b> .....	8
<i>Li, Huan ; Yang, Chunhe ; Zhang, Haina ; Yang, Jie ; Zhang, Yuhao ; Han, Yue ; Xue, Tianfu ; Ma, Changkun</i>	
<b>3D Modeling and Natural Fractures Characterization in Hassi Guettar Field, Algeria</b> .....	15
<i>Boualam, Aldjia ; Djezzar, Sofiane ; Rasouli, Vamegh ; Rabiei, Minou</i>	
<b>Accumulation Damage Assessment Method for Rock Mass Based on Vibration Energy Analysis</b> .....	21
<i>Xue, Y. D. ; Dong, H. X. ; Yang, R. ; Li, Sh. B.</i>	
<b>Acoustic Emission Monitoring of a Laboratory Hydraulic Fracturing Experiment on Montney Shale</b> .....	32
<i>Jia, S. Q. ; Wong, R. C. K. ; Eaton, D. W.</i>	
<b>Acoustic Emissions During Deformation of Sandstone with Fluids</b> .....	37
<i>Muqtadir, A. ; Al-Dughaimi, S. ; Ali, A. Z. ; Kandil, M. E. ; Dvorkin, J.</i>	
<b>Advanced Analysis of Damaging Seismic Events in Mines – A Case Study</b> .....	42
<i>Rebuli, D. B. ; Calixto, F. ; Coca Mazuela, J. A.</i>	
<b>Advanced Formation Testing Using a Wireline-Deployed Formation Testing Tool to Characterize In-Situ Stress Parameters in a Depleted Niagaran Pinnacle Reef Carbonate Reservoir</b> .....	49
<i>Raziperchikolae, S. ; Kelley, M. ; Moronkeji, D. ; Xu, H. ; Guillermo, B. ; Pardini, R.</i>	
<b>Advanced Test Methods for Investigating the Time-Dependent Behaviors of Rocks</b> .....	57
<i>Hashiba, K. ; Fukui, K.</i>	
<b>Advances in Hydromechanical Coupling for Complex Hydraulically Fractured Unconventional Reservoirs</b> .....	64
<i>Cottrell, M. G. ; Hartley, L. J. ; Libby, S.</i>	
<b>Analysis and Evaluation of Fragment Size Distributions in Rock Blasting at the Erdenet Copper Mine</b> .....	75
<i>Dondov, E. ; Chen, G. ; Dendev, N.</i>	
<b>Analysis of a Large Open Pit Mine in Western Australia Using Finite Element and Limit Equilibrium Methods</b> .....	85
<i>Bar, N. ; Yacoub, T. E. ; McQuillan, A.</i>	
<b>Analysis of Coupled Hydro-Mechanical Response in Deformable Porous Rock Using DEM</b> .....	93
<i>Nanda, K. ; Das, A. ; Misra, S.</i>	
<b>Analysis of Drilling-Induced Tensile Fracture Initiation in Porous, Permeable Media Considering Fluid Infiltration</b> .....	98
<i>Michael, A. ; Gupta, I.</i>	
<b>Analysis of Fracture Initiation and Broaching Resulting from Worst Case Discharge Events</b> .....	110
<i>Michael, A. ; Gupta, I.</i>	
<b>Analysis of Pressure/Flow Response Data from the EGS Collab Project</b> .....	120
<i>Ingraham, M. D. ; Knox, H. A. ; Strickland, C. E. ; Vermeul, V. R. ; Burghardt, J. A.</i>	
<b>An Analysis of Stresses and Displacements Around a Fault Due to Longwall Face Advance</b> .....	126
<i>Carlton, C. G. ; Chugh, Y. P.</i>	
<b>Analysis of the Microstructure Stress Distribution and Deformation Characteristics of Coal via CT 3D Reconstruction Technology</b> .....	138
<i>Wang, Gang ; Han, Dongyang ; Jiang, Chenghao ; Qin, Xiangjie</i>	
<b>Analysis of the Mobilization of Strength Parameters in Brittle Intact Rock</b> .....	150
<i>Cabezas, R. E. ; Vallejos, J. A.</i>	
<b>Analysis on Collapse Pressure and Fracture Pressure of a Borehole in Natural Gas Hydrate Formation</b> .....	158
<i>Tan, T. ; Zhang, H. ; Li, J. ; Wang, H. ; Cai, Z. ; Yu, Q. ; Yang, M. ; Chen, Y. ; Liu, K. ; Deng, Q.</i>	
<b>Analysis on Temperature Effects of Disc Cutters During the Rock-Cutter Interaction</b> .....	167
<i>Haiqing, Yang ; Bolong, Liu</i>	
<b>Analysis Study of Remote Displacement Monitored During CO<sub>2</sub> Injection into Reservoirs</b> .....	176
<i>Gao, X. ; Li, H. ; Zheng, L.-N. ; Jin, Y.</i>	
<b>Analytical and Numerical Estimates of Hydraulic Fracture Characteristics Created by a Wellbore Pressure Pulse</b> .....	186
<i>Chertov, M. A. ; Chaplygin, A. V.</i>	

<b>Anisotropic Permeability Evolution of Pre-Existing Natural Fractures in Cubic Coal Under True-Triaxial Stresses: An Experimental and Modelling Study .....</b>	<b>193</b>
<i>Liu, Y. B. ; Yin, G. Z. ; Zhang, D. M. ; Li, M. H.</i>	
<b>Anisotropic Strength and Elastic Properties of Poorman Schist at the EGS Collab Experiment 1 Site .....</b>	<b>199</b>
<i>Condon, K. J. ; Sone, H. ; Wang, H. F.</i>	
<b>The Anisotropy Induced Triaxial Stress State Controls the Failure of Low Porosity Anisotropic Rocks .....</b>	<b>207</b>
<i>Petruszalek, M. ; Lokajicek, T. ; Svitek, T. ; Jechumtalova, Z. ; Kolar, P. ; Sileny, J.</i>	
<b>Anisotropy of Shear Behaviors in Shale Based on an Open-Box-Style Inclined Shear Test .....</b>	<b>215</b>
<i>Chen, M. ; Xiu, N. L. ; Xu, Y. ; Zhang, S. C. ; Ma, X. F. ; Zou, Y. S. ; Li, S. H.</i>	
<b>Applicability of Ultrasonic Tomographic Technique for Progressive Damage Evaluation in Prismatic Rock Specimen.....</b>	<b>222</b>
<i>Butt, Awais ; Fragomeni, Cara ; Hedayat, Ahmadreza ; Tudisco, Erika</i>	
<b>Application of a Bingham Viscoplastic Model to Borehole Closure: Comparison Between Two Numerical Approaches.....</b>	<b>230</b>
<i>Xie, Xiyang ; Fjær, Erling ; Detournay, Christine</i>	
<b>Application of Artificial Intelligence to Predict Sonic Wave Transit Time in Unconventional Tight Sandstones.....</b>	<b>236</b>
<i>Muqtadir, Arqam ; Elkatatny, S. M. ; Tariq, Z. ; Mahmoud, M. A. ; Abdulraheem, A.</i>	
<b>Application of Integrated Geology and Geomechanics to Stimulation Optimization Workflow to Maximize Well Potential in a Tight Oil Reservoir, Ordos Basin, Northern Central China .....</b>	<b>244</b>
<i>Zhang, Kuangsheng ; Tang, Meirong ; Du, Xianfei ; Ma, Bing ; Qiu, Kaibin ; Wang, Lizhi ; Zhuang, Xiangqi ; Wang, Lipeng ; Pan, Yuanwei</i>	
<b>The Application of Micro-Sized Crosslinked Polymer Gel for Water Control to Improve Zonal Isolation in Cement Sheath: An Experimental Investigation.....</b>	<b>260</b>
<i>Abdulfarraj, Murad ; Imqam, Abdulmohsin</i>	
<b>Artificial Neural Network to Predict the Interaction Between Natural and Hydraulic Fracture.....</b>	<b>271</b>
<i>Silveira, B. T. ; Mejia, E. C. ; Roehl, D.</i>	
<b>Assessing Energy Budget of Laboratory Fault Slip Using Quantitative Micro-CT Image Analysis .....</b>	<b>277</b>
<i>Zhao, Qi ; Glaser, Steven D. ; Tisato, Nicola ; Grasselli, Giovanni</i>	
<b>Assessing the Geomechanical Behaviours of Skarn-Related Hydrothermal Veins in Intact Laboratory Tests.....</b>	<b>283</b>
<i>Clark, M. D. ; Day, J. J. ; Diederichs, M. S.</i>	
<b>Assessment of Existing Design Criteria for Wire-Wrapped Screens in Thermal Wells.....</b>	<b>294</b>
<i>Montero Pallares, J. D. ; Wang, C. ; Nouri, A. ; Haftani, M. ; Mahmoudi, M. ; Fattahpour, V.</i>	
<b>Assessment of Historic InSAR Monitoring Data Prior to the Manefay Slide at the Bingham Canyon Mine Using the Latest Analytical Techniques.....</b>	<b>302</b>
<i>Williams, C. ; Ross, B. ; Zebker, M. ; Gaida, M. ; Morkeh, J. ; Robotham, M. E.</i>	
<b>Assessment of Mine Water Inflow and Aquifer Interference.....</b>	<b>314</b>
<i>Adhikary, D. P. ; Guo, H.</i>	
<b>Back Analysis for Evaluation of Blast Re-Entry Analysis Techniques .....</b>	<b>321</b>
<i>Tierney, S. ; Cumming-Potvin, D. ; Hopkins, M. ; Lett, J.</i>	
<b>Back-Analysis of Viscoelastic Properties from Deep Shaft Radial Movement Measurements .....</b>	<b>331</b>
<i>Kottke, P. ; Stavrou, A. ; Rama, A. ; Lagger, H. ; Pollak, S.</i>	
<b>Bayesian Sensitivity Analysis to Enhance History Matching Through Shale Oil Reservoirs.....</b>	<b>337</b>
<i>Al-Mudhafar, Watheq J. ; Al Lawe, Erfan M. ; Alsubaih, Ahmed</i>	
<b>Behavior of a Salt Cavern When Creep Law Is Modified to Account for Low Deviatoric Stresses .....</b>	<b>346</b>
<i>Bérest, P. ; Manivannan, S.</i>	
<b>Behaviour and Realm of Application of Ubiquitous Joint Constitutive Models – Facts and Limitations.....</b>	<b>355</b>
<i>Carvalho, J. L. ; Lawrence, K. P. ; Moffitt, K. ; Yetisir, M.</i>	
<b>Bio-Cementation for Slope Soil Stabilization Against Surface Erosion: A Bench-Scale Preliminary Investigation.....</b>	<b>362</b>
<i>Gowthaman, S. ; Nakashima, K. ; Ebina, K. ; Kawasaki, S.</i>	
<b>Biot Coefficient of Gas Sorbing Rocks: A Coal Example.....</b>	<b>370</b>
<i>Adelina, Lv. ; Hossein, Masoumi ; Hamid, Roshan</i>	
<b>Biot's Effective Stress Coefficient Tensor Measurements on Mancos Shale.....</b>	<b>377</b>
<i>Zhou, Xuejun ; Ghassemi, Ahmad</i>	
<b>Bonded Particle Simulation of Cavity Expansion Test in Rock.....</b>	<b>391</b>
<i>Molaei, Fatemeh ; Fakhimi, Ali</i>	
<b>Calibration of Coal-Mass Model in a Longwall Mine: A Case Study. ....</b>	<b>399</b>
<i>Rashed, G. ; Mohamed, K. ; Gearhart, D. F. ; Esterhuizen, G. S.</i>	
<b>Case Studies of Parametric Assessments Using Numerical Modelling in Underground Mining .....</b>	<b>409</b>
<i>Campbell, A. D. ; Rademacher, T. ; Putzar, G. ; Beck, D. A.</i>	

<b>Casing Integrity Assessment of a Wellbore Crossing a Karst Cavity in a Carbonate Reservoir</b> .....	422
<i>Peña, W. D. L. ; Pereira, F. L. G. ; Firme, P. A. L. P. ; Roehl, D. ; Pereira, L. C.</i>	
<b>Cement Placement in Shale Fractures</b> .....	429
<i>Szewczyk, D. ; Opedal, N.</i>	
<b>Characteristics of Geothermal Reservoirs and Structural Geology for the Yangbajing Geothermal Field in Tibet, China</b> .....	437
<i>Feng, Jianyun ; He, Zhiliang ; Zhang, Ying</i>	
<b>Characterization of the Bakken Formation Using NMR and SEM Techniques</b> .....	444
<i>Tomomewo, O. S. ; Jabbari, H. ; Badrouchi, N. ; Onwumelu, C. ; Mann, M.</i>	
<b>Chemically-Induced Pressure Pulse for Unconventional Gas Fracturing: Modelling and Experimental Investigation</b> .....	452
<i>Al-Nakhli, Ayman ; Ruwaili, Khalid</i>	
<b>Chemo-Mechanical Investigation of CO<sub>2</sub>-Fluid-Rock Interaction in CO<sub>2</sub> Storage and CO<sub>2</sub>-EOR Processes in Unconventional Reservoirs</b> .....	460
<i>Prakash, R. ; Kana Nguene, P. ; Seers, T. D. ; Noshadravan, A. ; Abedi, S.</i>	
<b>A Classification and Description Method for Carbonate Reservoir Mechanical Properties Based on the Hoek-Brown Criterion</b> .....	470
<i>Tan, Q. ; Li, S. G. ; Su, P. ; Weng, H. Y. ; Xiao, Y.</i>	
<b>Cliff Stability at Tomb KV42 in the Valley of the Kings, Egypt: A First Approach to Numerical Modelling and Site Investigation</b> .....	478
<i>Alcaíno-Olivares, R. ; Perras, M. A. ; Ziegler, M. ; Maissen, J.</i>	
<b>Coal Rib Stability Based on the Strength Reduction of the Coal Mass Model</b> .....	488
<i>Mohamed, Khaled M. ; Cheng, Zhao ; Rashed, Gamal</i>	
<b>Coda Wave Interferometry Analysis on 4D Seismic Response From Poroelastic and Elastic Reservoirs</b> .....	496
<i>Alcantara, K. F. ; Roehl, D.</i>	
<b>Combining Discrete Element Method with Lattice Boltzmann Modeling to Advance the Understanding of the Performance of Proppant Mixtures</b> .....	501
<i>Fan, Ming ; Han, Yanhui ; Gu, Ming ; McClure, James ; Ripepi, Nino ; Westman, Erik ; Chen, Cheng</i>	
<b>Compaction-Induced Sand Control Failures in the Deepwater Gulf of Mexico</b> .....	511
<i>Tjioe, M. ; Mikulencak, D. R. ; Yang, Y.</i>	
<b>A Comparative Study of TBM Penetration Rate Assessment Based on the Rock Mass Properties</b> .....	517
<i>Adoko, A. C. ; Alipov, A. ; Yabukov, K.</i>	
<b>Comparing Biotite Elastic Properties Recovered by Nano-Indentation With Molecular Simulation Predictions</b> .....	525
<i>Lanin, E. S. ; Acker, C. ; Yu, Z. ; Sone, H. ; Wang, B.</i>	
<b>Comparing Different Methods of Permeability Measurement for Bakken Core Samples: Steady-State vs. Aspike &amp; Multi-Pulse</b> .....	533
<i>Badrouchi, N. ; Jabbari, H. ; Badrouchi, F. ; Tomomewo, O. S.</i>	
<b>Comparison and Evaluation of Failure Criteria for Cement Sheath in the Downhole Situations</b> .....	539
<i>Meng, M. ; Miska, S. ; Yu, M. ; Ozbayogu, E.</i>	
<b>Comparison of Basic Geotechnical Parameters of Crushed Waste Glass with Natural and Manufactured Sands</b> .....	546
<i>Kazmi, D. ; Williams, D. J. ; Serati, M.</i>	
<b>Comparison of Bonded-Particle Numerical Model Results With Indirect Tension Experimental Results for Dionysos Marble</b> .....	551
<i>Kaklis, K. N. ; Nomikos, P. P. ; Karatza, Z. T. ; Agioutantis, Z. G.</i>	
<b>Comparison of the AE Monitoring Results Between the Hydraulic Fracturing and SC-CO<sub>2</sub> Fracturing</b> .....	557
<i>Shan, W. ; Tiantai, L. ; Hongkui, G. ; Xiaoqiong, W. ; Ning, L. ; Mingsheng, Z. ; Shiyu, L. ; Yueyue, S.</i>	
<b>Comparison of X-Ray CT and 3D Laser Profiler for Rock Fracture Surface Measurements</b> .....	565
<i>Ueno, T. ; Yoshida, R. ; Nakashima, S. ; Yoshizu, Y. ; Song, C. ; Kishida, K.</i>	
<b>Complex Fractures Propagations of Infill Well Based on Reservoir Stress Evolution After Long-Time Shale Gas Production</b> .....	571
<i>Zhu, Haiyan ; Tang, Xuanhe ; Liu, Qingyou ; Song, Yujia ; Zhao, Yapu ; Li, Kuidong ; Xiao, Jialin ; McLennan, John D.</i>	
<b>Complex Influences on the Behavior of Sheared Eau Claire Formation: Insights From Computed Tomography</b> .....	583
<i>Gill, M. ; Moore, J. ; Brown, S. ; Mackey, P. ; Tennant, B. ; Crandall, D.</i>	
<b>Complex Wellbore Pressure Management for Managed Pressure Drilling (MPD) Testing on a Modern Drilling Test Rig</b> .....	591
<i>Chen, G. ; Munro, C. ; Wright, C. ; Olivas, V. ; Stuart, G. ; Johnson, R.</i>	

<b>A Comprehensive Experimental Investigation on Stress Response Behavior of Organic-Rich Shale Fracture Permeability</b> .....	601
<i>Lin, Chong ; Kang, Yili ; Li, Xiangchen ; Chen, Mingjun ; You, Lijun ; Wang, Qiaozhi</i>	
<b>Comprehensive Laboratory Investigation and Model Fitting of Klinkenberg Effect and Its Role on Apparent Permeability in Various U.S. Shale Formations</b> .....	609
<i>Li, Zihao ; Ripepi, Nino ; Chen, Cheng</i>	
<b>Compressive Failure Model to Distinguish Different Type of Breakouts in EGS Wells: A Newberry Case Study</b> .....	622
<i>Permata, Ilham A. ; Tutuncu, Azra N.</i>	
<b>Computational Fluid Dynamics (CFD) Modeling of Proppant Static Settling Velocity in High Viscosity Friction Reducers</b> .....	631
<i>Yuan, C. ; Ba Geri, M. ; Zeng, C. ; Imqam, A. ; Shen, L. ; Bogdan, A.</i>	
<b>A Computational Methodology to Reconstruct the Capillary Pressure vs Saturation Curve of Rocks Through Sorptivity Tests</b> .....	639
<i>Sarris, E. ; Gravanis, E. ; Papaloizou, L.</i>	
<b>Contribution of Rifting Activities to Spatial and Temporal Variations of Seismic B-Values Along the Gulf of Aden Area, Case Study</b> .....	647
<i>Basaloom, Abdullah ; Geri, Mohammed Ba</i>	
<b>Controlling Drilling Fluid Properties Using Bio-Degradable Environmental Friendly Additives: Comparison Between Conventional Chemical (PAC-LV) and Eco-Friendly Drilling Fluid Additives</b> .....	652
<i>Al-Hameedi, A. T. ; Alkinani, H. H. ; Dunn-Norman, S. ; Alkhamis, M. M. ; Alshammari, A. F. ; Al-Alwani, M. A. ; Mutar, R. A.</i>	
<b>Controlling Induced Seismicity During Hydraulic Stimulation of a 6 Km Deep Enhanced Geothermal System in Finland</b> .....	663
<i>Dresen, G. ; Kwiatek, G. ; Bohnhoff, M. ; Saarno, T. ; Heikkinen, P. ; Ader, T. ; Chendorain, M. ; Malin, P. ; Leary, P. ; Passmore, P. ; Valenzuela, S. ; Kukkonen, I. ; Bluemle, F. ; Martinez-Garzon, P. ; Wollin, C.</i>	
<b>CO<sub>2</sub> Sequestration/EOR in Bartlesville Sandstone Reservoir Bearing Heavy Oil</b> .....	668
<i>Hasan, Al-Saedi N. ; Ralph, Flori E.</i>	
<b>Coupled Effects of Diagenesis and Deformation on Fracture Evolution in Deeply Buried Sandstones</b> .....	678
<i>Wang, Q. ; Laubach, S. E. ; Fall, A.</i>	
<b>Coupled Geomechanics Simulation of Dynamic Fractures with Continuum Damage Mechanics and Its Influence on Production</b> .....	684
<i>Cai, Xin ; Liu, Wei ; Shen, Xipu ; Zhang, Zhang</i>	
<b>Coupled Hydro-Mechanical Modeling of Injection-Induced Seismicity in the Multiphase Flow System</b> .....	691
<i>Chang, K. W. ; Yoon, H. ; Martinez, M. J. ; Newell, P.</i>	
<b>A Coupled Thermo-Mechanical Model Based on TOUGH-FEMM for Simulating Thermal Cracking in Rocks</b> .....	696
<i>Tao, Siji ; Tang, Xuhai</i>	
<b>Coupled THMC Analysis for Predicting Hydro-Mechanical Evolution in Siliceous Mudstone</b> .....	701
<i>Ogata, S. ; Yasuhara, H. ; Aoyagi, K. ; Kishida, K.</i>	
<b>Coupled Ultrasonic and Digital Imaging of Crack Initiation and Growth in Prismatic Lyon Sandstone Rocks</b> .....	707
<i>Garg, Prasoon ; Shirole, Deepanshu ; Hedayat, Ahmadreza ; Griffiths, D. V.</i>	
<b>Coupling Geomechanics With Diffusion/Adsorption Mechanisms to Enhance Bakken CO<sub>2</sub>-EOR Modeling</b> .....	717
<i>Ellafi, A. ; Jabbari, H.</i>	
<b>Crack Behaviors Across the Coal-Rock Interface and the Acoustic Emission Response Characteristics in Hydraulic Fracturing</b> .....	726
<i>Jiang, Y. L. ; Liang, W. G. ; Li, Z. G.</i>	
<b>Creation of Multi-Stranded Fractures in Homogeneous Rocks</b> .....	733
<i>Manchanda, R. ; Zheng, S. ; Sharma, M. M.</i>	
<b>Creep Behavior of Musandam Limestone Fractures Under Confining Pressures Less than 1 MPa – Initial Investigation</b> .....	744
<i>Kang, H. ; Germaine, J. T. ; Einstein, H. H.</i>	
<b>CT-Scan Image Processing for Accurate Pore Network Modeling and Core Samples 3D Printing: Polynomial Interpolation &amp; Geostatistical QC</b> .....	752
<i>Almetwally, A. G. ; Jabbari, H.</i>	
<b>Cutoff Modeling for Drift Sealing in Underground Nuclear Waste Repositories</b> .....	760
<i>Sharma, P. ; Perras, M. ; Sharma, J. ; Lam, T. ; Kasani, H. ; Walton, G.</i>	
<b>Data Analytics Quickly Predict Number of Fracture Stages in Horizontal Wells</b> .....	768
<i>Alzahabi, Ahmed ; Kamel, Ahmed ; Trindade, A. Alexandre ; Baustian, Wade</i>	

## VOLUME 2

<b>Defining SRV in Naturally Fractured Reservoirs; How Is It Related to Production?</b> .....	778
<i>Wang, Y. ; Dusseault, M. B.</i>	
<b>Deformation and Failure Mechanism of a Collapse Induced by Underground mining—A Study of the Pusa Collapse in Guizhou Province of China</b> .....	796
<i>Shi, W. B. ; Yu, X. X. ; Sherizadeh, T. ; Sunkpal, M. ; Wang, X. M. ; Kulatilake, P. H. S. W.</i>	
<b>Deformation Characteristics of Unconsolidated Sandstone and Soft Mudstone and Their Effects on Drilling Engineering</b> .....	804
<i>Weng, H. Y. ; Deng, J. G. ; Tan, Q. ; Liu, H. L.</i>	
<b>DEM Models to Predict Side Shear Resistance of Rock-Socketed Piles Considering Socket Roughness</b> .....	811
<i>Gutiérrez-Ch, J. G. ; Melentijevic, S. ; Senent, S. ; Jimenez, R.</i>	
<b>Design and Construction of a Dense Array of Small Diameter Holes in a Large Cavern Sidewall</b> .....	818
<i>Elmo, Davide ; Mielman, Amichai ; Rozen, Arnon ; Tzucker, Dan</i>	
<b>Design Aspects of Optimized Zipper Frac</b> .....	826
<i>Algarhy, A. ; Soliman, M. ; Heinze, L. ; Gorell, S. ; Henderson, S. ; Nasr-El-Din, H. ; Gabry, M.</i>	
<b>De-Stress Blasting Strategy: Case Studies for Mining in Highly Stressed Sill Pillars at Vale's Ontario Operations</b> .....	834
<i>Yao, M. ; Chinmasane, D. R. ; Sampson-Forsythe, A.</i>	
<b>Detection of Deep Cavities and of Shallow Buried Objects with a Hilly Ground Surface</b> .....	841
<i>Adler, P. M. ; Pazdniakou, A.</i>	
<b>Determination of Temperature, Electrical Conductivity, Water Chemistry, and Density Profiles in the Water Column of a Closed Mine</b> .....	848
<i>Roggenthen, W. M. ; Scheetz, J. W.</i>	
<b>Developing a Rock Mechanical Coupling Study Over Drilling Through Hydrate Bearing Sediments.</b> .....	856
<i>Ansari, Ubedullah ; Cheng, Yuanfang ; Li, Qingchao ; Han, Zhongying</i>	
<b>Development of a 3D Numerical Tool for Assessing the Mechanical Impact of a Fault-Rupture by Normal Fault on Underground Excavations</b> .....	862
<i>Kim, B. H. ; Larson, M. K.</i>	
<b>The Development of a New Laboratory Technique to Monitor the Consolidation Process of Control Additives During Propped Hydraulic Fracturing Treatment</b> .....	870
<i>Alqam, M. H. ; Abass, H. H.</i>	
<b>Development of Fractal-Fuzzy Evaluation Methodology and Its Application for Seismic Hazards Assessment Using Microseismic Monitoring in Coal Mining</b> .....	877
<i>Cai, W. ; Durucan, S. ; Shi, J. Q. ; Cao, W. ; Agrawal, H. ; Korre, A. ; Jamnikar, S. ; Roser, J.</i>	
<b>Development of Novel Workflow to Replicate Pore Network of Porous Core Samples Through 3D Printing Technology</b> .....	887
<i>Almetwally, A. G. ; Jabbari, H.</i>	
<b>Development of Small Scale Biocemented Rocks Based on Natural Beachrock Cement Characteristics as a Novel Approach Towards Coastal Erosion Mitigation.</b> .....	895
<i>Nayanthara, P. G. N. ; Dassanayake, A. B. N. ; Kazunori, N. ; Kawasaki, S.</i>	
<b>Development Specific Modeling of Hydraulic Fracture Induced Poromechanical Pressure Responses in Offset Wells</b> .....	904
<i>Coenen, E. W. C. ; Spicer, S. A.</i>	
<b>DFN Variability Analysis Through Voxelization</b> .....	913
<i>Junkin, W. R. ; Ben-Awuah, E. ; Fava, L.</i>	
<b>Discussion on the Effective Stress Coefficient in Unconventional Fracture-Matrix Gas Transport</b> .....	923
<i>Wang, Yi ; Liu, Shiming ; Yue, Wenting ; Zhao, Yixin</i>	
<b>Distinct Element Method Simulation of Creep Behaviour</b> .....	931
<i>Gutiérrez-Ch, J. G. ; Senent, S. ; Jimenez, R.</i>	
<b>Dynamic Behaviors of Sandstone under True Triaxial Confinements: Triaxial Hopkinson Bar Tests</b> .....	936
<i>Liu, Kai ; Zhang, Qianbing</i>	
<b>Dynamic Fracture Network Generation: A New Method for Growing Fractures According to Their Deformation History</b> .....	946
<i>Libby, S. ; Hartley, L. ; Turnbull, B. ; Cottrell, M. ; Bym, T. ; Josephson, N. ; Munier, R. ; Selroos, J. O. ; Mas-Ivars, D.</i>	
<b>Dynamic Fracture Process Analysis of Controlled Blasts to Minimize the Excavation Damage Zone in Underground Excavations</b> .....	953
<i>Min, G. J. ; Park, S. W. ; Oh, S. W. ; Cho, S. H. ; Kim, B. H. ; Fukuda, D.</i>	
<b>A Dynamic Model of the Drilling Action of Percussive Tools</b> .....	961
<i>Song, X. ; Kane, A. ; Aamo, O. ; Detournay, E.</i>	

<b>Dynamic Neural Network Model to Predict the Rate of Penetration Prior to Drilling</b> .....	969
<i>Alkinani, H. H. ; Al-Hameedi, A. T. ; Dunn-Norman, S. ; Flori, R. E. ; Al-Alwani, M. A. ; Mutar, R. A.</i>	
<b>Dynamic Shear Fracture and SEM Study of Granite and Marble</b> .....	980
<i>Wu, G. ; Xing, H. ; Zhang, Q. ; Dehkhoda, S.</i>	
<b>Dynamic Stability Analysis of the Laizigou Phosphogypsum Tailings Pond</b> .....	989
<i>Wang, Tao ; He, Yuan ; Zhao, Xianyu ; Wang, Suifeng</i>	
<b>Dynamic Water Vapor Sorption on Marcellus Shales: Equilibrium, Thermodynamic and Kinetic Analyses</b> .....	996
<i>Sang, Guijie ; Liu, Shimin ; Elsworth, Derek</i>	
<b>The Effect of Anisotropy on the Borehole Instability in Carbonate Reservoir</b> .....	1003
<i>Zeng, Chao ; Deng, Wen</i>	
<b>The Effect of Blasting on Falls of Ground in Underground Mines</b> .....	1012
<i>Batista, G. A. P. ; Da Silva, J. H. ; Ramires, J. E. F. ; Carvalho, A. S. ; Campos, M. P. ; Gontijo, A. ; Matos, A. R.</i>	
<b>Effect of Borehole Notch Properties on Breakdown Pressure</b> .....	1018
<i>Altammar, Murtadha J. ; Sharma, Mukul M. ; Alruwaili, Khalid M.</i>	
<b>Effect of Capillary Force on Performance of Shale Rock Fracturing</b> .....	1025
<i>Liu, B. L. ; Suzuki, A. ; Ito, T.</i>	
<b>Effect of Cyclic Loading on Cement Sheath During Staged Fracturing</b> .....	1032
<i>Li, Xiaojiang ; Liu, Rengguang ; Zhou, Shiming ; Tao, Qian ; Lu, Peiqing ; Zeng, Yijin</i>	
<b>Effect of Depletion-Induced Stress Reorientation on Infill Well Fracture Propagation</b> .....	1039
<i>Yang, L. ; Zhang, F. ; Duan, Y. ; Yan, X. ; Liang, H.</i>	
<b>Effect of Drawdown Evolution on the Hydraulic Fractured Well Performance. Can We Minimize It and Optimize Well Economy?</b> .....	1051
<i>Hryb, D. E. ; De Marzio, L. ; Suarez, M. I.</i>	
<b>Effect of Drill Cuttings Mechanical Properties on Filter Cake Properties and Mud-Filtrate Invasion</b> .....	1058
<i>Ba Geri, Badr S. ; Mahmoud, M. ; Elkhatmy, S. ; Patil, S. ; Benaafi, M. ; Mohamed, A.</i>	
<b>Effect of Fault Roughness on Injection-Induced Seismicity</b> .....	1064
<i>Candela, Thibault ; Peters, Elisabeth ; Van Wees, Jan Diederik ; Fokker, Peter ; Wassing, Brecht ; Ampuero, Jean Paul</i>	
<b>Effect of High-Density Water-Based Drilling Fluid on the Mechanical Properties of the Drilled Formation in Horizontal Wells</b> .....	1070
<i>Mohamed, A. K. ; Benaafi, M. ; Elkhatmy, S. M. ; Bageri, B. S.</i>	
<b>The Effect of Hydraulic Fracturing in Coal Seam Using Viscoelastic Surfactant Fracturing Fluid</b> .....	1075
<i>Yang, Mengmeng ; Ge, Zhaolong ; Lu, Yiyu ; Chai, Chengjuan ; Zhou, Zhe</i>	
<b>The Effect of Inorganic Salt Transport and Two-Phase Seepage on Hydrate Wellbore Stability</b> .....	1082
<i>Wei, J. ; Cheng, Y.</i>	
<b>Effect of Irregular Shape and Wellbore Breakout on Fluid Dynamics and Wellbore Stability</b> .....	1089
<i>Kiran, R. ; Salehi, S. ; Mokhtari, M. ; Kumar, A.</i>	
<b>Effect of Layering in the Simultaneous Propagation of Fluid-Driven Fractures: A Coupled Hydro-Mechanical Model Using the Extended Finite Element Method</b> .....	1100
<i>Mehryaar, E. ; Moulaeifard, S. ; Goncalves Da Silva, B.</i>	
<b>Effect of Loading Rate on Tensile Strength of Coals in Underground Mines in Datong Coalfield, China</b> .....	1112
<i>Zhang, Jimwang ; Li, Meng</i>	
<b>Effect of Mineral Orientation on Roughness and Toughness of Mode I Fractures</b> .....	1117
<i>Jiang, Liyang ; Yoon, Hongkyu ; Bobet, Antonio ; Pyrak-Nolte, Laura J.</i>	
<b>The Effect of Multi-Hydraulic Fracturing on Casing Deformation in Shale Gas Horizontal Wells</b> .....	1122
<i>Zhang, Xin ; Li, Jun ; Liu, Gonghui ; Zhao, Chaojie ; Yao, Yong ; Jiao, Jianfang</i>	
<b>The Effect of Natural Fracture Complexity on Fracture Propagation in Deep Shale Based on True Tri-Axial Experiments</b> .....	1130
<i>Wang, Li ; Wan, Liming ; Chen, Wangang ; Yu, Xi ; Hou, Bing</i>	
<b>Effect of Natural Fracture Network Properties on Hydraulic Fracturing Stimulation in Unconventional Formations</b> .....	1137
<i>Ray, Baidurja ; Inyang, Ubong ; Bai, Jie</i>	
<b>Effect of Shear Slippage of Vertically Crossed Layer Interface on Hydraulic Fracture Height Growth</b> .....	1149
<i>Kresse, O. ; Weng, X.</i>	
<b>The Effect of Silica Content on the Changes in the Mechanical Properties of Class G Cement at High Temperature from Slurry to Set</b> .....	1157
<i>Mahmoud, Ahmed Abdulhamid ; Elkhatmy, Salaheldin</i>	
<b>Effect of the State of Stress in the Fracturing and Micro-Seismic Activity of Hydraulically-Fractured Granite</b> .....	1162
<i>Gunarathna, G. S. ; Goncalves Da Silva, B.</i>	



<b>Effective Cement Stress in Well Completions: An Important Unknown</b> .....	1175
<i>Welch, N. J. ; Frash, L. P. ; Carey, J. W.</i>	
<b>An Effective Optimization Method of One-Step Sandstone Acid Systems at Formation Conditions</b> .....	1181
<i>Yao, Erdong ; Li, Yuan ; Wang, Jie ; Zhang, Le ; Cao, Cong ; Zhou, Fujian</i>	
<b>Effects of Fluid Diffusivity on Hydraulic Fracturing Processes Using Visual Analysis</b> .....	1188
<i>Baptista-Pereira, C. ; Goncalves Da Silva, B.</i>	
<b>Effects of Longwall-Induced Subsurface Deformations and Permeability Changes on Shale Gas Well Integrity and Safety Under Shallow Cover</b> .....	1195
<i>Su, D. W. H. ; Zhang, P. ; Dougherty, H. ; Van Dyke, M. ; Minoski, T. ; Schatzel, S. ; Gangrade, V. ; Watkins, E. ; Addis, J. ; Hollerich, C.</i>	
<b>The Effects of Roughness and Mechanical Property of Rough Fracture Surface on Hydraulic Fracture Conductivity</b> .....	1213
<i>Lai, Jie ; Guo, Jianchun ; Wu, Kaidi ; Chen, Chi ; Wang, Kun ; Wang, Shibin ; Lu, Cong ; Zhao, Xuepei ; An, Huan</i>	
<b>Effects of Roughness on Permeability Evolution and Frictional Behavior of Fractures Under Shear</b> .....	1219
<i>Fang, Y. ; Elsworth, D. ; Ishibashi, T. ; Zhang, F.</i>	
<b>Effects of Spatial Variation of Cluster Entry Friction on Hydraulic Fracture Propagation in Multistage Fracturing</b> .....	1228
<i>Nikolskiy, D. ; Lecampion, B. ; Pourpak, H. ; Onaisi, A.</i>	
<b>Effects of Transient Axial Stress or Pore Pressure Disturbances on the Permeability of Shikotsu Welded Tuff</b> .....	1239
<i>Boeut, S. ; Fujii, Y. ; Kodama, J. ; Fukuda, D. ; Dassanayake, A. B. N.</i>	
<b>Efficient Incorporation of a Contact Model into a Fully Implicit Geomechanical Fracture Simulator</b> .....	1247
<i>Zheng, Shuang ; Manchanda, Ripudaman ; Sharma, Mukul M.</i>	
<b>EGS Collab Project: Status, Tests, and Data</b> .....	1255
<i>Kneafsey, T. J. ; Dobson, P. F. ; Ajo-Franklin, J. B. ; Guglielmi, Y. ; Valladao, C. A. ; Blankenship, D. A. ; Schwering, P. C. ; Knox, H. A. ; White, M. D. ; Johnson, T. C. ; Strickland, C. E. ; Vermeul, V. R. ; Morris, J. P. ; Fu, P. ; Mattson, E. ; Neupane, G. H. ; Podgorney, R. K. ; Doe, T. W. ; Huang, L. ; Frash, L. P. ; Ghassemi, A. ; Roggenthen, W.</i>	
<b>Elastic and Acoustic Properties of Dry and Saturated Fontainebleau Sandstones</b> .....	1274
<i>Nguyen, T. A. ; Pazdiakou, A. ; Adler, P. M.</i>	
<b>Elastic Anisotropy in Deep Carbonate Reservoir</b> .....	1282
<i>Al-Dughaimi, S. ; Ali, A. Z. ; Muqtadir, A. ; Kandil, M. E. ; Dvorkin, J.</i>	
<b>Enabling Technologies for Monitoring and Forecasting: Applications in Slope Stability and Dam Safety</b> .....	1290
<i>Tehrani, Faraz S. ; Costa, Ana Laura ; Peters, Ton</i>	
<b>Engineering Geological Characterization of the 2014 Jure Nepal Landslide: An Integrated Field, Remote Sensing-Virtual/Mixed Reality Approach</b> .....	1298
<i>Mysiorek, J. ; Onsel, I. E. ; Stead, D. ; Rosser, N.</i>	
<b>Estimating Far-Field Stress Using the Mean of Local Stresses</b> .....	1310
<i>Gao, K. ; Lei, Q. ; Bozorgzadeh, N. ; Chau, V.</i>	
<b>Estimating Mechanical Properties of Sandstone from Petrographic and Physico-Mechanical Indices</b> .....	1319
<i>Rekoske, J. ; Walton, G.</i>	
<b>Estimation of Elastic Properties of Bakken Formation Using an Artificial Neural Network Model</b> .....	1329
<i>Badrouchi, F. ; Badrouchi, N. ; Rabiei, M. ; Rasouli, V.</i>	
<b>Estimation of Geomechanical Property Distributions Using a Data Assimilation Procedure</b> .....	1341
<i>Tang, Huiying ; Hu, Xinrui ; Hu, Shuyong ; Dai, Cheng ; Zhu, Haiyan ; Zhang, Liehui</i>	
<b>Evaluating Characterization Methods for Joint Surface Roughness</b> .....	1351
<i>Packulak, T. R. ; Bonneau, D. A. ; Dossett, W. C. ; Rudderham, G. A. ; Day, J. J.</i>	
<b>Evaluating Stress and Strain by Integrating Microseismicity with Geomechanical Modeling</b> .....	1359
<i>Angus, D. A. ; Viegas, G. ; Bosman, K. ; Tremblay, F.</i>	
<b>Evaluation Method for Rigidity of Tunnel Concrete Lining Based on Its Vibration Characteristics</b> .....	1368
<i>Taniguchi, Tetsuya ; Jiang, Yujing ; Zhang, Xuepeng ; Kusaba, Masaya ; Yamato, Takahide</i>	
<b>Evaluation of Dynamic Flow and Production Behavior of Biogenic Methane Reservoirs</b> .....	1376
<i>Pandey, R. ; Harpalani, S.</i>	
<b>Evaluation of Influences of Mudstone Barriers on the Water Injection Performance in SAGD Wells</b> .....	1383
<i>Meng, H. ; Jin, Y. ; Lin, B. T. ; Wang, P. F. ; Lyu, Z. L. ; Liu, X.</i>	
<b>Evaluation of Parameters Affecting the Energy Accumulation in Longwall Mining</b> .....	1390
<i>Agrawal, H. ; Durucan, S. ; Cao, W. ; Cai, W.</i>	
<b>Evaluation of the Seismic Response of the Rock Mass Using a Model of Seismic Aftershocks of the Epidemic Type</b> .....	1400
<i>Gonzalez, F. J. ; Vallejos, J. A.</i>	

<b>Evaluation on Ground Suitability of Shield Tunneling Based on Rock Engineering System</b> .....	1409
<i>Cheng, Chihao ; Liao, Shaoming ; Liu, Mengbo ; Chen, Lisheng</i>	
<b>Evidence of a Consistent Process of Rock Fracturing During Material Flow Within Ore Columns – 25 Years of Fragmentation Experience at the El Teniente Mine</b> .....	1416
<i>Brzovic, A. ; Celhay, F. ; Gonzalez, R. ; Hurtado, J. P.</i>	
<b>Evolution of Coal Permeability to Gaseous CO<sub>2</sub>, N<sub>2</sub> and He Under In-Situ Stresses</b> .....	1426
<i>Sheng, Zhi ; Derek, Elsworth</i>	
<b>Expansion of Horizontal Wellbore Stability Model for Elastically Anisotropic Shale Formations With Anisotropic Failure Criteria: Permian Basin Case Study</b> .....	1434
<i>Wang, J. ; Weijermars, R.</i>	
<b>Experimental and Numerical Investigation into Hydraulic Fracture and Natural Fracture Interaction in Shale Formations</b> .....	1457
<i>Yildirim, B. ; Durucan, S. ; Cao, W. ; Cai, W. ; Shi, J. ; Korre, A. ; Wolf, K-H.</i>	
<b>Experimental and Numerical Investigation of Hydraulic Fracturing Under Reservoir Conditions</b> .....	1467
<i>Zhu, G. L. ; Sajji, R. P. ; Mubarak, H. ; Sousa, R. L. ; Sassi, M. ; Abu Al-Rub, R. K.</i>	
<b>Experimental and Numerical Investigation of the Microscale Failure Mechanism of a Porous Sandstone During Brazilian Tensile Test Conditions</b> .....	1474
<i>Chen, B. ; Latham, J. P. ; Xiang, J. ; Bakker, R. R.</i>	
<b>Experimental and Numerical Investigation on the Cement Sheath Sealing Failure Induced by Large-Scale Multistage Hydraulic Fracturing in Shale Gas Well</b> .....	1480
<i>Wang, Lei ; Yang, Chunhe ; Guo, Yintong ; Chang, Xin ; Xiao, Jialin ; Song, Yafen</i>	
<b>Experimental Investigation of Anisotropic Brittleness Under Confining Pressure for Gas Shale Rocks</b> .....	1489
<i>Ma, Tianshou ; Peng, Nian ; Chen, Ping ; Zhu, Gongsheng ; Xia, Hongquan</i>	
<b>An Experimental Investigation of Cyclic Cryogenic Fracturing in Coalbed Methane Reservoirs</b> .....	1497
<i>Yang, Ruiyue ; Hong, Chunyang ; Huang, Zhongwei ; Yang, Zheqi ; Huang, Pengpeng</i>	
<b>Experimental Investigation on the Characteristics of Complex Fractures Created by Supercritical Carbon Dioxide in a Layered Tight Sandstone Formation</b> .....	1505
<i>Li, S. H. ; Ma, X. F. ; Zhang, S. C. ; Zou, Y. S. ; Qi, S. L. ; Ge, Q. ; Li, N. ; Cao, T.</i>	
<b>Experimental Investigation on the Fracture Diverting Mechanism and Plugging Efficiency Using 3D Printing Fractures</b> .....	1512
<i>Li, Ben ; Zhou, Fujian ; Yuan, Lishan ; Li, Hui ; Cheng, Jiaqi ; Tan, Yanxin ; Zhang, Yang ; Xian, Bo ; Fan, Wentong</i>	
<b>Experimental Investigation on the Fracture Propagation Characteristics of the Continental Shale Induced by Hydraulic Fracturing</b> .....	1521
<i>Li, Xiao ; He, Peng-Fei ; He, Jian-Ming ; Zhao, Zhi-Heng</i>	
<b>Experimental Investigation on the Rock Damage Behaviors of Sandstone Containing a Pre-Existing 3-D Surface Flaw Under Cyclic Uniaxial Compression</b> .....	1528
<i>Ou, Chuanjing ; Cao, Ping ; Cao, Rihong ; Meng, Jingjing ; Lin, Hang ; Chen, Yu ; Liu, Taoying</i>	
<b>Experimental Research on the Effect of Cold Water Injection on the Mechanical Properties and Brittleness of Granite in HDR</b> .....	1538
<i>Li, N. ; Zhang, S. C. ; Ma, X. F. ; Zou, Y. S. ; Cao, T.</i>	
<b>Experimental Study of Injection Rate Influence on Hydraulic Fracturing</b> .....	1546
<i>Tiancheng, Liang ; Chuanyou, Meng ; Haifeng, Fu ; Bo, Cai ; Xin, Wang ; Yun, Xu ; Yunzhi, Liu</i>	

### VOLUME 3

<b>Experimental Study of the Effects of the Roughness, the Interlocking and the Material Mechanical Properties on the Apparent Cohesion of Unbonded Rock Joints in the Context of Dam Foundations</b> .....	1554
<i>Rulliere, A. ; Rivard, P. ; Peyras, L. ; Breul, P.</i>	
<b>Experimental Study of the Hydro-Mechanical Response of Tight Sarvak Carbonates to Hydrostatic and Deviatoric Stress Changes</b> .....	1560
<i>Ahmadinejad, A. ; Rahimzadeh Kivi, I. ; Ameri, M. J. ; Khatibi, S. A.</i>	
<b>The Experimental Study of the Shale Bedding Impact on Fracture Energy Anisotropy</b> .....	1571
<i>Pan, R. ; Zhang, G. Q. ; Xing, Y. K. ; Li, S. Y. ; Zheng, X. L. ; Tang, M. R.</i>	
<b>An Experimental Study of the Wear of Polycrystalline Diamond Compact Bits</b> .....	1577
<i>Michaels, I. H. ; Mostofi, M. ; Richard, T.</i>	
<b>Experimental Study of Tip Screenout Fracturing by Using CT Scanner</b> .....	1586
<i>Ito, T. ; Yoshida, H. ; Yamamoto, K. ; Tsuchiya, Y.</i>	
<b>Experimental Study on Drag Reduction Performance in Fracture</b> .....	1592
<i>Fan, Fan ; Zhou, Fujian ; Liu, Zhiyu ; Yang, Kai</i>	

<b>Experimental Study on Hydraulic Fracture Propagation in Conglomerate Reservoirs</b> .....	1598
<i>Xv, Changzhuo ; Zhang, Guangqing ; Yanjun, Lyu ; Wang, Pu</i>	
<b>Experimental Study on Imitation Soil Nail Reinforcing Technology for Deep Broken Roadway Support in Jinchuan Mine</b> .....	1603
<i>Huayou, Su ; Ning, Yang ; Jin, Huang</i>	
<b>Experimental Study on Mechanical Properties of Crushed Coal Seams Enhanced by Freezing</b> .....	1608
<i>Zheng, Xuelin ; Zhang, Guangqing ; Li, Zhaoxing ; Chen, Lei ; Pan, Rui ; Liu, Rui</i>	
<b>Experimental Study on Mechanical Properties of Sandstone Under Freeze-Thaw Condition</b> .....	1615
<i>Pu, Hai ; Sha, Ziheng ; Liu, Ding ; Liu, Senhao</i>	
<b>Experimental Study on Sand Control in Unconsolidated Sandstones by Chemical Injection and Hydraulic Fracturing</b> .....	1625
<i>Palencia Yrausquin, E. ; Liu, W. ; Zhou, B. ; Kamgue Lenwoue, A. R.</i>	
<b>Experimental Study on Sand Production of Natural Gas Hydrate Reservoir</b> .....	1635
<i>Ding, Jiping ; Cheng, Yuanfang ; Yan, Chuanliang ; Han, Songcai</i>	
<b>Experimental Study on the Anisotropy of Shale with Wave Velocity and Permeability</b> .....	1642
<i>Wang, X. Q. ; Wu, S. ; Ge, H. K. ; Chen, H. ; Wang, J. B.</i>	
<b>Experimental Study on the Conductivity of Chelating Acid Fracturing in Ultra-Deep Compact Sandstone</b> .....	1650
<i>Wang, Jin ; Zhou, Fujian ; Zhang, Lufeng ; Wang, Yuechun</i>	
<b>An Experimental Study on the Fracture Mechanics Characteristics of Heat-Treated Hot Dry Rock Samples Under Different Loading Rates</b> .....	1656
<i>Wang, Daobing ; Yu, Bo ; Yan, Xingming ; Sun, Dongliang ; Han, Dongxu ; Qin, Hao ; Zhang, Wenbao</i>	
<b>Experimental Study on the Impact of CO<sub>2</sub>-Brine-Rock Interaction on Rock Properties and Fracture Propagation During Supercritical CO<sub>2</sub> Fracturing in Chang-7 Tight Sandst...</b> .....	1664
<i>Li, S. H. ; Zhang, S. C. ; Zou, Y. S. ; Qi, S. L. ; Ma, X. F. ; Li, N. ; Chen, M.</i>	
<b>An Experimental Study on the Impacts of Different PDC Cutters Arrangements on a Bit on Rock Cutting Process</b> .....	1672
<i>Sheikhrezaei, K. ; Akbari, B.</i>	
<b>An Experimental Study to Investigate the Effects of Temperature and Confining Pressure on Unconventional Rock Mechanical Properties</b> .....	1679
<i>Ramezani, M. ; Emadi, H. ; Elwegaa, K.</i>	
<b>Experiments and Modeling of Acid Dissolution Fingering</b> .....	1686
<i>Papamichos, E. ; Stroggylis, P.</i>	
<b>An Extended Finite Element Method for Hydro-Mechanically Coupled Analysis of Mud Loss in Naturally Fractured Formations</b> .....	1697
<i>Xia, Yang ; Jin, Yan ; Huang, Zhao ; Lu, Yunhu ; Wang, Hanqing</i>	
<b>Facilitation of Fluid-Driven Fracture Propagation in Porous Media by Injection of Reactive Fluids</b> .....	1705
<i>Shovkun, I. ; Espinoza, D. N.</i>	
<b>Fall of Ground Characterization: A Case Study of BCL Mine, Botswana</b> .....	1711
<i>Adoko, A. C. ; Zhalel, M. ; Phumaphi, P. T.</i>	
<b>The Fast Marching Method for Simulation of Coupled Flow and Geomechanics and Fault Activation</b> .....	1721
<i>Yoon, Sangcheol ; Kim, Jihoon</i>	
<b>Fiber Bragg Grating-Based Investigation on Reactivating Natural Fractures by Hydraulic Fracturing</b> .....	1728
<i>Lyu, Y. J. ; Zhang, G. Q. ; Zhuang, J. M. ; Zhao, Z. F.</i>	
<b>Field Development Recommendation Utilizing 3D Geomechanical Model for an Unconventional Play in Colombia</b> .....	1733
<i>Medina, Leonardo Arias ; Tutuncu, Azra N.</i>	
<b>Formation Evaluation and Hydraulic Fracture Modeling of Unconventional Reservoirs: Sab'atayn Basin Case Study</b> .....	1759
<i>Ellafi, A. ; Ba Geri, M. ; Bubach, B. ; Jabbari, H.</i>	
<b>Formation of a Sealing Well Barrier by the Creep of Rock Salt: Numerical Investigations</b> .....	1769
<i>Orlic, B. ; Wollenweber, J. ; Geel, C. R. ; Vandeweyer, V. P. ; Meekes, J. A. ; Heerens, G. J. ; Terhegge, J. H.</i>	
<b>Fracability Evaluation of Tight Sandstone Reservoirs Based on Fractal Dimension and Fracture Angle After the Rock Mechanics Triaxial Experiments</b> .....	1776
<i>Zhang, Binhai ; Chen, Zhengrong ; Cao, Yanfeng ; Guo, Shisheng ; Peng, Chengyong ; Tao, Lei</i>	
<b>Fracture Conductivity Analysis on the Degradable Particle Diverter Combined with Engineered Proppant</b> .....	1787
<i>Zhang, Lufeng ; Zhou, Fujian ; Zhang, Shicheng ; Wang, Jie ; Wang, Jin ; Pournik, Maysam</i>	
<b>Fracture Hits Analysis for Parent-Child Well Development</b> .....	1792
<i>Anusarn, Sangnimuan ; Li, Jiawei ; Wu, Kan ; Wang, Yonghong ; Shi, Xiaozhi ; Yin, Congbin ; Li, Yanchao</i>	
<b>Fracture Propagation Induced by Water Injection in Poorly Consolidated Rocks</b> .....	1800
<i>Gao, Y. ; Hakobyan, Y. ; Detournay, E.</i>	

<b>Fracturing Fluids Impact on Unconventional Shale Rock Mechanical Properties and Proppant Embedment</b> .....	1809
<i>Singh, V. K. ; Wolfe, C. ; Jiao, D.</i>	
<b>From Aseismic Slip to Seismicity During Fluid Injection Controlled by Interactions Between Stress Perturbation, Permeability Increases and Fault Structure</b> .....	1816
<i>Cappa, F. ; De Barros, L. ; Wynants-Morel, N. ; Guglielmi, Y. ; Birkholzer, J. ; Nussbaum, C.</i>	
<b>From Two-Phase Flow to Gas Fracturing into Callovo-Oxfordian Claystone</b> .....	1823
<i>De La Vaissière, Rémi ; Talandier, Jean ; Armand, Gilles ; Vu, Minh-Ngoc ; Cornet, Francois Henri</i>	
<b>Fully Autonomous Drone for Underground Use</b> .....	1832
<i>Hennage, D. H. ; Nopola, J. R. ; Haugen, B. D.</i>	
<b>Fully-Coupled Three-Dimensional Finite Element Simulations of the Interaction Between a Hydraulic Fracture and a Pre-Existing Natural Fracture</b> .....	1841
<i>Almulhim, O. A. ; Paluszny, A. ; Thomas, R. N. ; Zimmerman, R. W.</i>	
<b>Gas Saturated Coal Failure Envelope Establishment Through Single Core Multistage Triaxial Loading Tests</b> .....	1849
<i>Fan, Long ; Liu, Shimin</i>	
<b>Gas Storage in Compartmentalized Reservoirs: A Numerical Investigation on Possible “Unexpected” Fault Activation</b> .....	1857
<i>Teatini, P. ; Ferronato, M. ; Franceschini, A. ; Frigo, M. ; Janna, C. ; Zoccarato, C. ; Isotton, G.</i>	
<b>A General Review on Rock Stability Due to CO<sub>2</sub> Injection</b> .....	1866
<i>Reppas, N. ; Gui, Y. L. ; Wetenhall, B.</i>	
<b>Geomechanical Characterization of a Granodiorite Rock Specimen from Patua Geothermal Field</b> .....	1877
<i>Kc, B. ; Foroutan, M. ; Kamali-Asl, A. ; Ghazanfari, E. ; Cladouhos, T. T.</i>	
<b>Geomechanical Characterization of Reservoir Rocks in the Southern Taranaki Basin, New Zealand</b> .....	1886
<i>Hill, S. H. ; Villeneuve, M. C. ; Bassett, K. N.</i>	
<b>Geomechanical Characterization of the Tight Sandstones of Lajas Formation, Neuquén Basin, Argentina</b> .....	1895
<i>Chiachiarelli, F. C. ; Merchán, V.</i>	
<b>Geomechanical Evaluation of Natural Shear Fractures in the EGS Collab Experiment 1 Test Bed</b> .....	1901
<i>Frash, L. P. ; Welch, N. J. ; Carey, J. W.</i>	
<b>Geomechanical Evaluation of the Stability of the Caprock Roof and Salt Boundary of an Abandoned Cavern in Salt Dome</b> .....	1908
<i>Park, B. Y.</i>	
<b>Geomechanical Investigation of the Carbon Sequestration Reservoir at Rock Springs Uplift, Wyoming, USA</b> .....	1916
<i>Ng, K. ; Yu, H. ; Wang, H. ; Kaszuba, J. ; Alvarado, V. ; Grana, D. ; Campbell, E.</i>	
<b>Geomechanical Modeling of Sediment Stress-Level Dependency With Application to a Salt System</b> .....	1922
<i>Nikolinakou, M. A. ; Heidari, M. ; Flemings, P. B. ; Hudec, M. R.</i>	
<b>Geomechanics Numerical Code for Modelling Contact in Fractures and Other Discontinuities Using Virtual Element Method</b> .....	1928
<i>Kubeyev, A. ; Maier, C. ; Doster, F.</i>	
<b>Geometric and Fractal Analysis of Complex Wormholes Resulting from Gypsum Core Flood Tests</b> .....	1941
<i>Li, W. ; Einstein, H. H. ; Germaine, J. T.</i>	
<b>Geometry of Shear Fractures and Fracture Permeability</b> .....	1952
<i>Carey, J. W. ; Frash, L. P. ; Euser, B. ; Welch, N. ; Lei, Z. ; Rougier, E.</i>	
<b>A Geostatistical Approach to Modelling DFN: A Block Size Perspective</b> .....	1958
<i>Wang, C. J. ; Vecchiarelli, A.</i>	
<b>Global vs Local Strain Measurements in Triaxial Tests – Implications</b> .....	1968
<i>Perbawa, A. ; Gramajo, E. ; Finkbeiner, T. ; Santamarina, J. C.</i>	
<b>Ground Control Management at Alamos's Young Davidson Mine</b> .....	1976
<i>Xu, Y. ; Blake, T. ; Feng, X-T. ; Cai, M. ; Xu, Y.</i>	
<b>How Can Accumulated Damage Lead to a Violent Rock Failure? an Innovative Experimental Study for Rockburst</b> .....	1992
<i>Akdag, S. ; Bruning, T. ; Karakus, M. ; Nguyen, G. D.</i>	
<b>How Hydraulic Fractures Interact with Natural Fractures: A Review and New Observations</b> .....	1998
<i>Kolawole, Oladoyin ; Ispas, Ion</i>	
<b>How Strong Is Your Fault?</b> .....	2024
<i>Brem, A. G. ; Abd Rahim, M. H. ; Zhang, T. ; Chan, A. W.</i>	
<b>Hydraulic Fracture Propagation and Its Interaction with Open and Sealed Natural Fractures</b> .....	2030
<i>Rueda, C. J. ; Mejia, S. C. ; Roehl, D.</i>	
<b>Hydraulic Fracture Propagation in Strike-Slip Regime With Weak Interfaces</b> .....	2039
<i>Celleri, H. M. ; Castez, M. F. ; Serebrinsky, S. ; Sánchez, M. ; Álvarez, J. P. ; Winograd, E. A. ; Vitolo, M.</i>	

<b>Hydraulic Fracture Propagation Velocity and Implications for Hydraulic Fracture Diagnostics</b> .....	2048
<i>Tinni, A. ; Sondergeld, C. ; Chandra, R.</i>	
<b>Hydraulic Fracture Swarms and Irregular Stress Shadows</b> .....	2055
<i>Busetti, S.</i>	
<b>Hydraulic Fracturing with Variable Injection Rate in Layered Tight Formations Monitored by Acoustic Emission</b> .....	2065
<i>Li, N. ; Ma, X. F. ; Zhang, S. C. ; Zou, Y. S. ; Wu, S. ; Li, S. H.</i>	
<b>Hydro-Mechanic Behavior of Synthetic Carbonate Rocks Subjected to Injection of a Reactive Fluid</b> .....	2072
<i>Galindo, K. B. T. ; Lima, A. ; Guimarães, L. J. N. ; Silva, K. C. L. ; Lins, C. M. M. S.</i>	
<b>Hydromechanical and Thermal Characterization of the Induced Hydraulic Fracture in Horstberg Geothermal Reservoir</b> .....	2080
<i>Hassanzadegan, Alireza ; Tischner, Torsten</i>	
<b>Hydro-Mechanical Modeling of Internal Erosion in Dike</b> .....	2087
<i>Yang, Jie ; Laouafa, Farid ; Yin, Zhen-Yu ; Hicher, Pierre-Yves</i>	
<b>Hydro-Mechanical Modelling of Naturally Fractured Reservoirs</b> .....	2094
<i>Mejia Sanchez, E. C. ; Quevedo, R. ; Roehl, D.</i>	
<b>Identification of Critical Factors Contributing to Increased Demand on Ground Support Elements at LaRonde Mine</b> .....	2101
<i>Sasseville, G. ; Grenon, M. ; Morissette, P.</i>	
<b>Impact of Mineralogy on Creep Properties and Production Decline Rates</b> .....	2111
<i>Slim, M. ; Hofmann, R. ; Saxena, N. ; Zhai, Z. ; Hows, A. M.</i>	
<b>Impact of Petrophysical Heterogeneity on Hydraulic and Mechanical Responses of Ultra-Heavy Oil Sand Reservoirs Under Micro-Fracturing</b> .....	2118
<i>Chen, S. ; Wang, Q. Q. ; Pan, J. J. ; You, H. J. ; Huang, Y. ; Lin, B. T. ; Sheng, M.</i>	
<b>Impact of Rock Falls on Inhabited Areas</b> .....	2125
<i>Barla, Giovanni</i>	
<b>Impacts of Stress-Level Dependency of Mudrock Mechanical Behavior on the Pore Pressure and Structural Style of Critical Tapers</b> .....	2134
<i>Heidari, M. ; Nikolinakou, M. A. ; Flemings, P. B. ; Hudec, M. R.</i>	
<b>Implementing Spatial Variance and Investigating the Effect on the Stability of a Mine Entry Roof in a Longwall Coal Mine</b> .....	2142
<i>Gao, Danqing ; Mishra, Brijes ; Xue, Yuting</i>	
<b>The Implications of Using Anisotropic Elasticity and Fully-Triaxial Failure Criteria for Borehole Stability Analysis in Shales</b> .....	2148
<i>Setiawan, N. B. ; Zimmerman, R. W.</i>	
<b>Improving Wellbore Strengthening Property of Water-Based Drilling Fluid by Addition of Barite Nanoparticles</b> .....	2154
<i>Akhtarmanesh, S. ; Hareland, G. Jr. ; Hareland, G. ; Nygaard, R.</i>	
<b>Incidence of Saturation and Fabric on the Physical and Mechanical Behaviour of Soft Carbonate Rocks</b> .....	2161
<i>Andriani, G. F. ; Lollino, P. ; Perrotti, M. ; Fazio, N. L.</i>	
<b>Inclined Fractures and Branches Induced by Supercritical CO<sub>2</sub>: Laboratory Study</b> .....	2166
<i>Zhou, Dawei ; Zhang, Guangqing ; Wang, Pu ; Wu, Wenrui</i>	
<b>Incorporating DFN Analysis in Rock Engineering Systems Blast Fragmentation Models</b> .....	2174
<i>Junkin, W. R. ; Ben-Avuah, E. ; Fava, L.</i>	
<b>Incorporating Veined Rock Mass Characteristics into Engineering Design and Caving</b> .....	2183
<i>Bewick, R. P. ; Campbell, R. ; Brzovic, A. ; Schwarz, A. ; Pierce, M.</i>	
<b>Indentation Based Method to Determine the Mechanical Properties of Randomly Oriented Rock Cuttings</b> .....	2193
<i>Martogi, D. ; Abedi, S.</i>	
<b>Inferring Current Day and Paleo Stress Orientation from Natural Fracture Geometry</b> .....	2201
<i>Likrama, F. ; Ouriri, F. ; Bouarfetine, D. ; Hammoudi, A. ; Ouargli, A. ; Iddir, M.</i>	
<b>Influence of Flaw Geometry on Crack Coalescence Across a Frictional Interface in a Rock Model Material</b> .....	2210
<i>De Melo Moura, D. ; Bobet, A.</i>	
<b>Influence of Fracture Roughness on Shear Strength, Slip Stability and Permeability: A Micro Mechanistic Analysis by 3D Digital Rock Physics</b> .....	2218
<i>Wang, Chaoyi ; Elsworth, Derek ; Fang, Yi ; Zhang, Fengshou</i>	
<b>Influence of Horizontal Bedding on Vertical Extension of Hydraulic Fracture and Stimulation Performance in Shale Reservoir</b> .....	2227
<i>Nailing, Xiu ; Yun, Xu ; Yuzhong, Yan ; Xin, Wang ; Tiancheng, Liang ; Haifeng, Fu ; Yongjun, Lu</i>	

<b>Influence of Hydrate Decomposition on the Stability of Submarine Slope in Shenhu Area, South China Sea</b> .....	2233
<i>Song, Benjian ; Cheng, Yuanfang ; Yan, Chuanliang ; Han, Zhongying ; Li, Qingchao</i>	
<b>Influence of Longwall Mining on the Stability of Shale Gas Wells in Barrier Pillars</b> .....	2247
<i>Zhang, Peter ; Su, Daniel ; Lu, Jun</i>	
<b>Influence of Microwave Irradiation Distance on Electromagnetism, Temperature and Stress Field in Rock</b> .....	2256
<i>Zhang, Z. Q. ; Liu, D. L. ; Zou, G. Q. ; Chen, F. F.</i>	
<b>The Influence of Parameter Characterization and Scale Effects on Tunnel Inflow Estimates</b> .....	2265
<i>Carney, Matthew C. ; Waterman, Matthew K.</i>	
<b>Influences of Microstructure Changes on the Permeability of Simulated and 3D Printed Rock Masses</b> .....	2272
<i>Demuro, J. ; Kim, S. ; Zhu, C.</i>	
<b>Insights From Sensitivity Analysis of Geomechanical Modelling of a Salt Structure Offshore West Africa</b> .....	2280
<i>Hooghvorst, J. J. ; Harrold, T. D. ; Nikolinakou, M. A. ; Fernández, O. ; Marcuello, A.</i>	
<b>In-Situ Acoustic Emission Monitoring in Mines</b> .....	2288
<i>Manthei, G. ; Plenkers, K. ; Philipp, J. ; Naoi, M. ; Moriya, H. ; Nakatani, M.</i>	
<b>In-Situ Stress Measuring Technology Based on Borehole Shape and Case Study</b> .....	2295
<i>Han, Zengqiang ; Wang, Chuanying ; Wang, Yiteng ; Wang, Chao</i>	
<b>Integrating Complex Fracture Modeling and EDFM to Optimize Well Spacing in Shale Oil Reservoirs</b> .....	2302
<i>Wu, Kan ; Yu, Wei ; Miao, Jijun</i>	
<b>Integration of Fine-Scale, Plug, and Well-Log Geomechanical Properties</b> .....	2310
<i>Hampton, J. ; Boitcott, G.</i>	
<b>Integration of geophysics, geomechanics and hydrodynamics to characterize induced seismicity triggered by hydraulic fracturing in the Duvernay Reservoir near Fox Creek, Alberta</b> .....	2319
<i>Hui, Gang ; Chen, Shengnan ; Chen, Zhangxing ; Gu, Fei</i>	
<b>Intelligent Data-Driven Analytics to Predict Shear Wave Velocity in Carbonate Formations: Comparison Between Recurrent and Conventional Neural Networks</b> .....	2325
<i>Alkinani, H. H. ; Al-Hameedi, A. T. ; Dunn-Norman, S. ; Flori, R. E. ; Al-Alwani, M. A. ; Mutar, R. A.</i>	

#### VOLUME 4

<b>Interpreting Inter-Well Poroelastic Pressure Transient Data: An Analytical Approach</b> .....	2334
<i>Manchanda, R. ; Elliott, B. ; Seth, P. ; Sharma, M. M.</i>	
<b>Introduction and Application of the Dynamic Impact Tester</b> .....	2346
<i>Berghorst, A. ; Knox, G.</i>	
<b>Investigating Effects of Thermal Shock Technique on Unconventional Reservoir Rock Mechanical Properties</b> .....	2353
<i>Elwegaa, Khalid ; Emadi, Hossein ; Ramezani, Mahdi</i>	
<b>Investigating the Factors Controlling Intact Rock Damage Mechanisms in Jointed Pillars</b> .....	2361
<i>Sharif, Ladan Karimi ; Elmo, Davide ; Stead, Doug</i>	
<b>Investigation for Channel Fracturing Based on Coupled Implementation of Lattice Boltzmann Method and Constitutive Model of Proppant Pillar</b> .....	2371
<i>Haiyan, Zhu ; Zhang, Minghai ; Liu, Qingyou ; Lei, Zhengdong ; Huang, Bo ; Zhang, Quansheng ; Chen, Yong ; Zhang, Liaoqun</i>	
<b>Investigation of Interface Cementation Failure Mechanism Under Downhole Mechanical-Chemical Condition</b> .....	2386
<i>Wang, Kongyang ; Yan, Wei ; Deng, Jingen ; Li, Lei ; Li, Wenbo ; Tian, Hao ; Xie, Shiyuan ; Xie, Shaoli</i>	
<b>Investigation of Rock Mass Stability for a Large Tunnel Crossing Faulted Zone: From Mechanical Tests to Numerical Simulation</b> .....	2392
<i>Zhang, Yuting ; Ding, Xiuli ; Huang, Shuling ; Liu, Dengxue</i>	
<b>Investigation of Rockburst in Deep Underground Mines, a Case Study of Mfulira Mine, Copperbelt, Zambia</b> .....	2403
<i>Sinkala, P. ; Nishihara, M. ; Fujii, Y. ; Fukuda, D. ; Kodama, J. ; Chanda, E.</i>	
<b>Investigation of Super-Critical CO<sub>2</sub> Effect on Fracture Toughness of Tight Sandstone Containing Weak Planes</b> .....	2413
<i>Kuangsheng, Zhang ; Yanjun, Zhang ; Tongwu, Zhang ; Xiaohu, Bai ; Shun, Liu ; Guangqing, Zhang ; Yuanxun, Nie</i>	
<b>Investigation of the Rock Strength Anisotropy on the Wellbore Stability Analysis</b> .....	2419
<i>Ahmed, A. Alsubaih ; Hayfaa, L. Swadi ; Nuhad, Alkanaani ; Erfan, M. Al Lawe ; Ahmed, I. Aljarah ; Swadi, Madhi ; Tariq, K. Khamees</i>	

<b>Investigations on Thermally-Induced and Gas-Pressure Driven Fractures in Rock Salt</b> .....	2429
<i>Siemann, L. ; Leuger, B. ; Zapf, D.</i>	
<b>Isotropic Versus Anisotropic Stress Field Effects on Hydraulic Fracture Mechanisms in Opalinus Shale</b> .....	2435
<i>Aldajani, O. A. ; Germaine, J. T. ; Einstein, H. H.</i>	
<b>Joint-Enriched Finite Element Modeling of Fault Slip Under Fluid Injection in Reservoir Faults</b> .....	2444
<i>Zeppilli, D. ; Zhu, C. ; Pouya, A.</i>	
<b>Kinematic Analysis of Rock Slopes Using Photogrammetry From a Small Unmanned Aerial Vehicle (sUAV)</b> .....	2454
<i>Zorn, E. V. ; Zorn, A. V. ; Kutschke, W. G.</i>	
<b>Kinematic Rock Slope Stability Near Major Facilities</b> .....	2461
<i>Dershowitz, W. ; Hosseinpour, H. ; Rogers, S.</i>	
<b>A Laboratory and Numerical Investigation of Flawed Rock-Like Plates in Compression</b> .....	2470
<i>Lotidis, M. A. ; Mytilinaiou, D. E. ; Nomikos, P. P. ; Sofianos, A. I.</i>	
<b>Laboratory In-Situ Visualization of Long-Term Fracture Closure and Proppant Embedment in Brittle and Ductile Shale Samples</b> .....	2475
<i>Nakagawa, S. ; Borglin, S. E.</i>	
<b>A Laboratory Investigation of the Effect of Bedding Plane Inclination Angle on Hydro-Fracturing Breakdown Pressure in Stratified Rocks</b> .....	2483
<i>Hadei, M. R. ; Veiskarami, A. ; Sherizadeh, T. ; Sunkpal, M.</i>	
<b>Laboratory Investigation on Freezing-Assisted Fracturing of Coal Seam</b> .....	2488
<i>Fan, Z. Y. ; Zhang, G. Q. ; Zhang, T. W. ; Zheng, X. L.</i>	
<b>Laboratory Stick-Slip Events Due to Direct Fluid Injection</b> .....	2494
<i>Cebry, S. B. L. ; McLaskey, G. C.</i>	
<b>Laboratory Study and Numerical Simulation of Mechanism of Failure on Hydraulic Fracturing in Unconsolidated Sandstones</b> .....	2501
<i>Palencia Yrausquin, E. ; Liu, W. ; Zhou, B. ; Kamgue Lenwoue, A. R.</i>	
<b>Laboratory Study of Hydraulic Fracturing Behavior of Weakly-Consolidated Sediments Under True-Triaxial Stress Regimes</b> .....	2515
<i>Gwaba, D. C. ; Germanovich, L. N. ; Hurt, R. S. ; Ayoub, J. ; Stanchits, S.</i>	
<b>Laboratory Study on Sand Production in Moderately Consolidated Sandstones</b> .....	2527
<i>Liu, X. G. ; Ma, Y. W. ; Liu, B. S. ; Li, Z. H. ; Yan, X. J. ; Liu, W.</i>	
<b>Lab-Scale Experiments Investigating the Possibility of Bedding Plane Slip Events During Microseismic Monitoring of Hydraulic Fracturing</b> .....	2536
<i>Hu, Lianbo ; Ghassemi, Ahmad ; Riley, Spencer ; Kahn, Dan</i>	
<b>Lattice Simulation of Fracture Propagation in the Bakken Formation</b> .....	2542
<i>Badrouchi, F. ; Wan, X. ; Bouchakour, I. ; Akash, O. ; Rasouli, V. ; Damjanac, B.</i>	
<b>Lattice Simulations of Hydraulic Fracture Reorientation from Perforations</b> .....	2548
<i>Akash, O. ; Vamegh, R. ; Djabelkhir, N. ; Badrouchi, F. ; Damjanac, B. ; Zhang, F.</i>	
<b>Length-to-Diameter Ratio (L/D) of Rotary Sidewall Cores and Its Implications for Estimating Compressive Strengths (UCS or CCS) in Petroleum Geomechanics</b> .....	2555
<i>Prasad, U. ; Moronkeji, D. A. ; Shouse, R. ; Funes, D. A. ; Wolfe, C.</i>	
<b>Leveraging Return of Experience to Improve the Success Rate of Formation Stress Tests: A Case Study in the Gulf of Mexico</b> .....	2563
<i>Bérard, T. ; Mishra, V. K. ; Cedillo, G. ; Pineda, W. ; Chugunov, N. ; Prioul, R.</i>	
<b>Linearized Predictor Method for the Efficient Iterative Solution of Coupled Geomechanics – Fracture Flow Problems</b> .....	2574
<i>Zheng, Shuang ; Manchanda, Ripudaman ; Shrivastava, Kaustubh ; Sharma, Mukul M.</i>	
<b>Lithological Classification of Limestones With Self-Organizing Maps</b> .....	2581
<i>Isleyen, E. ; Demirkan, D. C. ; Duzgun, H. S. ; Rostami, J.</i>	
<b>Lithology Determination from Drilling Data Using Artificial Neural Network</b> .....	2588
<i>Al-Khdheewi, Emad A. ; Mahdi, Doaa Saleh ; Feng, Runhua</i>	
<b>Load-Bearing Behaviour of Steel Casing as Well as Annulus Cementation Regarding Salt Cavern Wells Subjected to Long-Term Operation – A Contribution to Integrity Analysis</b> .....	2593
<i>Lux, K. H. ; Wolters, R. ; Pan, T. J.</i>	
<b>Long-Term Deformation and Stability Analysis of Underground Gas Storage Caverns in Salt Rock</b> .....	2602
<i>Deng, J. Q. ; Liu, Y. R. ; Yang, Q. ; Cui, W. ; Zhu, Y. B. ; Liu, Y. ; Zhang, G. X.</i>	
<b>Long-Term Permeability Experiments of a Single Fracture in Granite Under Thermal Conditions and Evaluation of the Aperture Distribution Through Microfocus X-Ray CT</b> .....	2612
<i>Song, C. L. ; Nakashima, S. ; Yasuhara, H. ; Iseki, K. ; Kishida, K.</i>	
<b>Longwall Gateroad Yield Pillar Response and Model Verification – A Case Study</b> .....	2618
<i>Klemetti, T. M. ; Van Dyke, M. A. ; Compton, C. S. ; Tulu, I. B. ; Tuncay, D. ; Wickline, J.</i>	

<b>Lost Circulations Due to Fault Reactivation and the Implications on Stress Characterization</b> .....	2630
<i>Chan, A. W. ; Brem, A. G. ; Abd Rahim, M. H.</i>	
<b>Making Sense of It All – Characterizing Deceiving Rock Masses</b> .....	2640
<i>Badner, D. ; Griffiths, C. ; Tasse, E. ; Bewick, R. P. ; Yohana, V. ; Mardiansyah, F. ; Kriska, B. ; Fajar, J.</i>	
<b>Measuring Pressure Dependent Permeability in Shales: Impact of Stress Path and Anisotropy</b> .....	2649
<i>Crawford, B. R. ; Freyesteinsson, J. A. ; Gupta, G. ; Homburg, J. M. ; Lonnes, S.</i>	
<b>Mechanical and Geophysical Monitoring of Slip Along Frictional Discontinuities</b> .....	2660
<i>El Fil, H. ; Bobet, A. ; Pyrak-Nolte, L. J.</i>	
<b>The Mechanism of Fracture Initiation in Shale Rocks: Pottsville Cap-Rock-Shale vs. Marcellus Unconventional Reservoir-Shale</b> .....	2668
<i>Du, Hui ; Radonjic, Mileva</i>	
<b>A Mechanistic Model for Thermal Spallation of Geological Materials</b> .....	2677
<i>Seagraves, A. N.</i>	
<b>Methane Pore Pressure Depletion Experiments on Coal Seam Gas Reservoir Rock</b> .....	2686
<i>Dudley, J. W. ; Deviney, D. B. ; Rai, U. B. ; Hol, S. ; Hummel, N. ; Sutton, H. ; Gear, I.</i>	
<b>Method for Estimating Permeability in Carbonate Reservoirs From Typical Logging Parameters Using Functional Network</b> .....	2693
<i>Tariq, Zeeshan ; Mahmoud, Mohamed ; Abdulraheem, Abdulazeez</i>	
<b>A Methodology to Measure Fracture Aperture Using a Consumer Grade Digital Camera</b> .....	2699
<i>Villamor, Lora R. ; Li, B. Q. ; Einstein, H. H.</i>	
<b>Microearthquake Enhanced Permeability Imaging of a Stimulated Well</b> .....	2709
<i>Riffault, J. ; Dempsey, D. ; Archer, R.</i>	
<b>Micromechanical and Homogenization Modelling for a Hydrating Oilwell Cement Paste</b> .....	2722
<i>Agofack, N.</i>	
<b>A Micromorphic Critical State Plasticity Model for Capturing the Size-Dependent Anisotropic Effect of Shale, Clay, and Mudstone</b> .....	2731
<i>Bryant, E. C. ; Sun, W.</i>	
<b>Micropore Volume Modification for Coal Using Non-Contaminating Cryogenic Liquid Nitrogen and Its Impact on Sorption and Diffusion Behaviors</b> .....	2737
<i>Yanga, Yun ; Liua, Shimin</i>	
<b>Microscale Pore Characterization of Bakken Formation</b> .....	2747
<i>Onwumelu, Chioma ; Nordeng, Stephan ; Adeyilola, Adedoyin ; Nwachukwu, Francis ; Azenkeng, Alexander ; Smith, Steven</i>	
<b>Microstructural Comparison of the Impact of Drilling Fluids Contamination and Casing Corrosion on Wellbore Cement Barriers</b> .....	2757
<i>Li, Y. ; Radonjic, Mileva</i>	
<b>Microstructure Interpretation of the Effects of Carbon Nanotubes on Mechanical Properties of Rocks and on Natural Fracturing Disturbance Enhancement</b> .....	2765
<i>Zhang, G. Q. ; Lin, Y. ; Nie, Y. X. ; Zhao, B.</i>	
<b>Mine Plan Optimization with Effective Use of Pit Slope Horizontal Drains</b> .....	2771
<i>Lloyd-Mills, Frank ; Dowling, Jeremy</i>	
<b>Minimizing Lost Circulation Non-Productive Time for Naturally Fractured Formations</b> .....	2782
<i>Alkinani, H. H. ; Al-Hameedi, A. T. ; Dunn-Norman, S. ; Flori, R. E. ; Al-Alwani, M. A.</i>	
<b>Minimum In Situ Stress and Fracture Propagation Pressure Data Acquisition in Brazilian Pre-Salt Environment</b> .....	2794
<i>Azevedo, C. T. ; Neumann, L. F. ; Medeiros, I. S. ; Pereira, L. C.</i>	
<b>Mining Between Graphite Schist and Variable Quality Backfill</b> .....	2800
<i>Py, A. ; Falmagne, V.</i>	
<b>Modeling Anisotropy of Sorptive Unconventional Rocks</b> .....	2807
<i>Saurabh, S. ; Harpalani, S.</i>	
<b>Modeling Fluid Flow in Biogenic Gas Reservoirs Using Imaging Approaches</b> .....	2814
<i>Pandey, R. ; Harpalani, S.</i>	
<b>Modeling of Anisotropic Sorption-Induced Coal Deformations</b> .....	2822
<i>Liu, Ang ; Liu, Shimin</i>	
<b>Modeling of Brittle Failure Based on a Hoek &amp; Brown Yield Criterion: Parametric Studies and Constitutive Validation</b> .....	2832
<i>Marinelli, F. ; Zalamea, N. ; Vilhar, G. ; Brasile, S. ; Cammarata, G. ; Brinkgreve, R.</i>	
<b>Modeling of in Situ Stresses in a Shale Gas Reservoir Embedded with Finite Fault Networks Considering Formation Heterogeneity</b> .....	2840
<i>Gao, Yanfang ; Chen, Mian ; Hou, Bing ; Lin, Botao ; Zhang, Kunpeng ; Pang, Huiwen ; Wang, Wenzhi</i>	



<b>Modeling of Plate Impact Experiments in Westerly Granite Using the Combined Finite-Discrete Element Method</b> .....	2852
<i>Chau, V. ; Rougier, E. ; Lei, Z. ; Knight, E. ; Gao, K. ; Hunter, A. ; Srinivasan, G. ; Viswanathan, H.</i>	
<b>Modeling of Waterless Stimulation with Multiple Energetic Sources: Parametric Study for Experiment Design</b> .....	2857
<i>Vorobiev, O. Y. ; Morris, J. P. ; Grubelich, M. C.</i>	
<b>Modeling Permeability and Fluid Flow Through Packed Particles: From a Unitary System to Binary Mixture</b> .....	2863
<i>Huang, J. ; Omer, M. ; Fragachan, F. E.</i>	
<b>Modeling Rock Bolt Behavior by Using the Interface Model of DEM</b> .....	2875
<i>Weng, Meng-Chia ; Chiu, Chia-Chi ; Jeng, Fu-Shu ; Lin, Yu-Cheng</i>	
<b>Modeling the Impact of Interfaces in a Layered Rock on Fracture Propagation and Resulting Height</b> .....	2883
<i>Hammerquist, C. Chad ; Nairn, John A. ; Aimene, Yamina ; Ouenes, Ahmed</i>	
<b>Modeling the Response of Reinforcement Elements During Dynamic Loading</b> .....	2891
<i>Marulanda, Y. ; Vallejos, J.</i>	
<b>Modifications to the Testing Equipment and Encapsulation Methodology for Direct Shear Testing of Rock Joints</b> .....	2898
<i>Stilwell, I. R. ; Billings, M. A. ; Schmidt, E. S.</i>	
<b>Monitoring Laboratory Hydraulic Fractures in Pre-Fractured Shale Using High-Resolution Optical and Neutron Imaging Techniques</b> .....	2906
<i>Roshankhah, S. ; Rubino, V. ; Marshall, J. P. ; Rosakis, A. J. ; Andrade, J. E. ; Tengattini, A. ; Ando, E. ; Viggiani, G.</i>	
<b>A Multi-Phase-Field/polycrystal Plasticity for Rock Salt: Micromorphic Regularized Grain-Boundary Slip</b> .....	2914
<i>Na, S. H. ; Sun, W. C.,</i>	
<b>A Multi-Physics Model for Low Salinity Water Injection to Improve Oil Recovery in Liquid-Rich Shale Formations</b> .....	2920
<i>Bui, Binh T. ; Tutuncu, Azra N.</i>	
<b>Multiple-Panel Longwall Top Coal Caving Induced Microseismicity: Monitoring and Development of a Statistical Forecasting Model for Hazardous Microseismicity</b> .....	2935
<i>Cao, W. ; Durucan, S. ; Cai, W. ; Shi, J. Q. ; Korre, A.</i>	
<b>Multiscale Geomechanical Analysis of the Hydraulic Fracturing Test Site</b> .....	2945
<i>Morris, J. P. ; Sherman, C. S. ; Fu, P. ; Settgast, R. R. ; Huang, J. ; Fu, W. ; Wu, H. ; Hao, Y. ; Ryerson, F. J.</i>	
<b>Multiscale Rock-Physics Modeling of Effective Elastic Properties of Fractured Reservoir Rocks</b> .....	2951
<i>Bayuk, I. O. ; Dubinya, N. V. ; Garagash, I. A. ; Tikhotskiy, S. A. ; Tikhotskaya, O. A.</i>	
<b>Nanoscale Coal Deformation and Its Geomechanics Effect on Pore Structure Evolution Under Hydrostatic and Uniaxial Compression Conditions</b> .....	2960
<i>Zhang, Rui ; Liu, Shimin</i>	
<b>Narrow Versus Wide Fairway Fracture Geometry</b> .....	2971
<i>Qiu, Dezhi ; Vamegh, Rasouli ; Danjanac, Branko ; Wan, Xincheng</i>	
<b>Nature's Solution to Wellbore Gas-Leakage: Gilsonite</b> .....	2978
<i>William, B. ; Daniel, V. ; Radonjic, Mileva</i>	
<b>A New Abutment Angle Equation for Deep Cover Coal Mines</b> .....	2987
<i>Tuncay, D. ; Tulu, I. B. ; Klemetti, T.</i>	
<b>New Acoustic Emission Parameters for Hydraulic Fracture Network Description Based on Shear-Tensile Crack Model</b> .....	2994
<i>Shan, W. ; Tiantai, L. ; Hongkui, G. ; Xiaoqiong, W. ; Ning, L. ; Yueyue, S.</i>	
<b>New Concept for the Stress Analysis on Rock Burst Failure Based on Modified Mohr's Stress Circle Representation</b> .....	3001
<i>Gong, Weili ; Gao, Xia ; E Sousa, L. Ribeiro ; He, Manchao</i>	
<b>New Contributions to Intact Rock Strength Through Automated Triaxial Testing</b> .....	3010
<i>Venter, J. ; Hamman, E. C. F. ; Purvis, C.</i>	
<b>A New Experimental Approach for Hydraulic Fracturing Fluid Optimization: Especially Focus on the Ultra-Deep Tight Gas Formation</b> .....	3017
<i>Li, Hui ; Li, Ben ; Zhou, Fujian ; Zhang, Donghang ; Zhang, Yang ; Xian, Bo ; Xue, Yangpeng</i>	
<b>New Global Correlations to Assess Depletion-Induced Compaction of Progressively-Buried Sandstone</b> .....	3023
<i>Hol, S. ; Dudley, J. W. ; Van Der Linden, A. J.</i>	
<b>A New Laboratory to Undertake Climatically Controlled Static Loading and Constant Strain Tests: Design and Preliminary Results</b> .....	3028
<i>Li, Y. ; Leith, K. ; Moradian, O. ; Loew, S. ; Perras, M. A.</i>	
<b>A New Method for Reservoir Fracture Characterization and Modeling Using Surface Analog</b> .....	3034
<i>Djezzar, Softiane ; Rasouli, Vamegh ; Boualam, Aldjia ; Rabiei, Minou</i>	

<b>A New Method of Anti-Collision While Drilling Based on Radial Gradient Measurement</b> .....	3043
<i>Zhang, Sen ; Diao, Binbin ; Gao, Deli</i>	
<b>A New Radar-Based Method for Detecting and Tracking Rockfall in Open-Pit Mines and Transportation Corridors</b> .....	3050
<i>Michellini, A. ; Viviani, F. ; Leoni, L. ; Coli, N. ; Thomson, C. ; Van Rensburg, D. ; Stopka, C. J.</i>	
<b>New Technologies for Time-Dependent Failure Modeling of Discontinuities in Rock Containing Intact Rock Bridges</b> .....	3056
<i>Chun, K. H. ; Kemeny, John</i>	
<b>Notch Driven Hydraulic Fracturing in Open Hole Completions: Numerical Simulations of Lab Experiments</b> .....	3064
<i>Djabelkhir, Nejma ; Song, Xueling ; Wan, Xincheng ; Akash, Omar ; Rasouli, Vamegh ; Damjanac, Branko</i>	
<b>A Novel Approach of Stress Dependent Permeability Modeling of Nanoporous Rocks</b> .....	3070
<i>Suman, Saurabh</i>	
<b>A Novel Diamond Hybrid Bit Improved Performance in Hard and Abrasive Formations</b> .....	3082
<i>Yu, J. P. ; Zou, D. Y. ; Liu, X. A.</i>	
<b>A Novel Enriched Galerkin Method for Modelling Coupled Mechanical Deformation in Heterogeneous Porous Media</b> .....	3088
<i>Kadeethum, T. ; Nick, H. M. ; Lee, S. ; Richardson, C. N. ; Salimzadeh, S. ; Ballarin, F.</i>	
<b>A Novel Hydraulic Fracturing Method and Case Study Based on Proppant Settlement Transport Model</b> .....	3098
<i>Lu, C. ; Ma, L. ; Zhang, T. ; Guo, J. C. ; Feng, Q. ; Li, M. ; Huang, B.</i>	
<b>Novel Methodology to Reduce the Strength of High Stress-Tight Gas Reservoirs Using Thermochemical</b> .....	3105
<i>Al-Nakhli, Ayman ; Bataweel, Mohammed ; Mustafa, Ayyaz ; Tariq, Zeeshan ; Mahmoud, Mohamed ; Abdulrahim, Abdulazeez</i>	

## VOLUME 5

<b>Novel True Triaxial Apparatus Applied to the Study of Thermal Effects on Water Injectivity Under Anisotropic Stress Conditions</b> .....	3114
<i>Walle, L. E. ; Berntsen, A. N. ; Bauer, A.</i>	
<b>Novel Wellbore Failure Geometry Evolution and Stabilization Model for Shale Formations</b> .....	3119
<i>Tan, C. P. ; Teng, G. E. ; Kamaruddin, N. M. F. ; Musa, I. H. ; Maung, M. M. T. ; Mohamad-Hussein, A. ; Ni, Q. ; Minton, J.</i>	
<b>Numerical Analysis of Internal Stability of Granular Geomaterials Against a Washout Driven by Fluid Flow</b> .....	3129
<i>Kim, H. M. ; Hwang, I. T. ; Ryu, D. W.</i>	
<b>Numerical Analysis of Sand Production in Heavy Oil Thermal Recovery Wells Considering Thermal-Hydro-Mechanical Coupling</b> .....	3135
<i>Deng, Fucheng ; He, Liang ; Wang, Lihua ; Sun, Dongzheng</i>	
<b>Numerical Analysis of Wellbore Integrity and Cement Sheath Debonding for Wells in the Eugene Island OPD, Gulf of Mexico</b> .....	3144
<i>Wise, J. ; Nygaard, R. ; Hareland, G.</i>	
<b>A Numerical Approach to Upgrade the Estimation of Gas Diffusion Coefficient in Coal Matrix</b> .....	3152
<i>Liu, Peng ; Yin, Guangzhi ; Liu, Shimin</i>	
<b>Numerical Finite Element Modeling of Stress Changes Due to Clusters Array on Unconventional Shale Reservoir</b> .....	3167
<i>Merchán, V. ; Acosta, M. ; Teran, C.</i>	
<b>Numerical Investigation of 2D Non-Planar Hydraulic Fracture Propagation Behaviors Influenced by Pre-Existing Fractured and Unfractured Wells</b> .....	3172
<i>Gao, Qi ; Cheng, Yuanfang ; Han, Songcai ; Li, Yang ; Yan, Chuanliang ; Han, Zhongying ; Wei, Jia</i>	
<b>Numerical Investigation of Hydraulic Fracturing and Well Placement in Multilayered Shale Oil Reservoirs Using RFPA-Petrol</b> .....	3182
<i>Li, T. ; Rutqvist, J. ; Hu, M. ; Li, L. ; Tang, C. ; Zhang, Q. ; Li, A.</i>	
<b>Numerical Investigation of Micromechanisms of Thermal Strengthening in Rock</b> .....	3191
<i>Wong, L. N. Y. ; Zhang, Y. H.</i>	
<b>A Numerical Investigation on Geomechanical Responses of a Pilot-Scale CO<sub>2</sub> Storage Site, South Korea</b> .....	3198
<i>Yoon, Sangcheol ; Lee, Hikweon ; Kim, Jihoon ; Shinn, Young Jae</i>	
<b>Numerical Investigation on Installation Process of Displacement Pile</b> .....	3206
<i>Duan, N. ; Lu, Y. ; Cheng, Y. P.</i>	

<b>Numerical Model Validation and Analysis of a Dipping Limestone Pillar Using FLAC3D .....</b>	<b>3210</b>
<i>Sears, M. M. ; Slaker, B. ; Rashed, G. ; Winfield, J.</i>	
<b>Numerical Modeling Aspects of Fluid-driven Interface Debonding after Wellbore Plugging and Abandonment.....</b>	<b>3218</b>
<i>Asala, H. I. ; Gupta, I.</i>	
<b>Numerical Modeling of Evolving Discontinuities in Rocks Using Solid Interface Finite Elements .....</b>	<b>3231</b>
<i>Maedo, M. A. ; Sánchez, M. ; Manzoli, O. ; Cleto, P. R. ; Guimarães, L.</i>	
<b>Numerical Modeling of Indirect Hydraulic Fracturing in Coalbed Methane Reservoir .....</b>	<b>3239</b>
<i>Wang, P. F. ; Liu, W. ; Deng, J. G.</i>	
<b>Numerical Modeling of Well Interference Across Formations at the Hydraulic Fracturing Test Site.....</b>	<b>3246</b>
<i>Huang, J. ; Fu, P. ; Morris, J. P. ; Settgest, R. R. ; Sherman, C. S. ; Hao, Y. ; Ryerson, F. J.</i>	
<b>Numerical Modeling of Wellbore Stability and Sand Production of Heavy Oil Reservoir With Cyclic Steam Stimulation.....</b>	<b>3255</b>
<i>Xu, J. ; Deng, J. G. ; Lin, H. ; Chen, Y. ; Jia, L. X. ; Liu, W.</i>	
<b>Numerical Modelling of the Influence of In-Situ Stress, Rock Strength and Hole-Profile Geometry on the Stability of Radial Water Jet Drill (RJD) Boreholes .....</b>	<b>3265</b>
<i>Latham, J-P. ; Farsi, A. ; Xiang, J. ; Clark, E. ; Bakker, R. R.</i>	
<b>Numerical Simulation of CO<sub>2</sub> Injection in Shale Gas Reservoir Considering Adsorption-Desorption.....</b>	<b>3273</b>
<i>Zhang, Le ; Zhou, Fujian ; Wang, Jie ; Yao, Erdong</i>	
<b>Numerical Simulation of Gas Migration in Low-Permeable Rocks Using Morpho-Mathematical Operations – Water Drainage and Imbibition .....</b>	<b>3279</b>
<i>Zhang, X. ; Duveau, G. ; Colliat, J. B.</i>	
<b>Numerical Simulation of Integrated Hydraulic Fracturing, Production and Refracturing Treatments in the Bakken Formation .....</b>	<b>3286</b>
<i>Wan, X. ; Rasouli, V. ; Damjanac, B. ; Torres, M. ; Qiu, D.</i>	
<b>Numerical Simulation of Localized Compaction Creep in Heterogeneous Porous Rock .....</b>	<b>3292</b>
<i>Shahin, G. ; Buscarnera, G.</i>	
<b>Numerical Simulation of Rock Erosion Performance of a High-Speed Water Jet Using an Immersed Body Method.....</b>	<b>3299</b>
<i>Xiang, J. ; Latham, J-P ; Pain, C.</i>	
<b>Numerical Simulation of Time-Dependent Wellbore Instability in Naturally Fractured Shale Formation.....</b>	<b>3306</b>
<i>Lin, H. ; Deng, J. G. ; Liu, W. ; Yuan, W. W. ; Xie, T.</i>	
<b>Numerical Simulation of Wellbore Stability in Frozen Soil During Drilling Operation.....</b>	<b>3315</b>
<i>Yang, Li. ; Chuanliang, Yan. ; Yuanfang, Cheng. ; Songcai, Han. ; Qi, Gao. ; Jia, Wei</i>	
<b>Numerical Simulation on Hydro-Mechanical Coupling During Gas Transport in Shale.....</b>	<b>3324</b>
<i>Wei, Shiming ; Jin, Yan ; Huang, Zhao ; Xia, Yang</i>	
<b>Numerical Simulations of a Poroplastic Medium Considering Generalized Plastic Effective.....</b>	<b>3332</b>
<i>Da Silva, R. O. ; Santos, E. S. R. ; Murad, M. A. ; Obregon, J. A. L.</i>	
<b>Numerical Study on the Time-Dependent Behavior of Rock Joints .....</b>	<b>3339</b>
<i>Xue, Yuting ; Mishra, Brijes</i>	
<b>Of the Stress Sensitivity of Sonic Wave Velocity and the Reliability of Sonic Tools in Unconventional Tight Gas Sand Reservoirs.....</b>	<b>3346</b>
<i>Germay, C. ; Lhomme, T. ; Camilion, E.</i>	
<b>On the Bifurcation Behavior of RSS Steering Capabilities .....</b>	<b>3353</b>
<i>Marck, J. ; Zalluhoglu, U.</i>	
<b>On the Border Between Brittle and Ductile Behavior of Shale.....</b>	<b>3364</b>
<i>Holt, R. M. ; Fjær, E. ; Larsen, I. ; Stenebråten, J. F. ; Raaen, A. M.</i>	
<b>On the Characterization of Bakken Formation: Oscillating-Pulse, Pulse-Decay Permeability Measurement &amp; Geomechanics.....</b>	<b>3371</b>
<i>Assady, A. ; Jabbari, H. ; Ellafi, A. M. ; Goudarzi, B.</i>	
<b>On the Sanding and Flow Convergence Skin in Cased and Perforated Slotted Liner Vertical Production Wells.....</b>	<b>3382</b>
<i>Velayati, A. ; Roostaie, M. ; Sharbatian, A. ; Fattahpour, V. ; Mahmoudi, M. ; Lange, C. F. ; Nouri, A.</i>	
<b>Operationalization of Wellbore Strengthening in the Deepwater Gulf of Mexico .....</b>	<b>3396</b>
<i>Husain, T. M. ; Tjioe, M.</i>	
<b>Operations Management in Seismically Active Mines.....</b>	<b>3402</b>
<i>Beck, D. A. ; Campbell, A.</i>	
<b>Optimized Pore Pressure and Fracture Gradient Prediction for a Highly Deviated Subsalt Well in a Depleted Reservoir.....</b>	<b>3412</b>
<i>Li, S. ; Ricci, L. ; McKay, D. ; Mitchell, P. ; Cruz, E.</i>	

<b>Optimizing Drawdown Program for a Miocene Field by Applying Geomechanical Modelling to Quantify Casing Integrity Risk</b> .....	3416
<i>Araujo, E. ; Morley, D. ; Neutzler, C. ; Bryant, D. ; Akajagbor, C. ; Jo, H.</i>	
<b>Overcoming Rock Engineering Challenges for Construction of Transport Tunnels in the Himalayas</b> .....	3424
<i>Bhasin, R. ; Grimstad, E. ; Aarset, A. ; Malik, S.</i>	
<b>Overcoming Subsurface and Batch Drilling Challenges in a Heavily Faulted Deepwater Environment</b> .....	3431
<i>Abd Rahim, M. H. ; Chan, A. W. ; Brem, A. G. ; Seli, P. ; Khodaverdian, M. F.</i>	
<b>Pastefill Optimisation at Hecla Québec's Casa Berardi Mine</b> .....	3441
<i>Alcott, J. ; Dallaire, D. ; Belem, T.</i>	
<b>Permeability and Deformation Mechanisms During Triaxial Testing of Early-Age Cement</b> .....	3448
<i>Bauer, S. J. ; Wilson, J. ; Matteo, E. N. ; Bettin, G.</i>	
<b>Permeability and Rigidity of Green River Shale Before and After Interaction with Water</b> .....	3457
<i>Yildirim, L. T. O. ; Elsworth, D. ; Wang, J. Y.</i>	
<b>Permeability Damage of Coal for Guar Gel Fracturing Operation</b> .....	3469
<i>Huang, Qiming ; Liu, Shimin</i>	
<b>Permeability Evolution of Limestone During Formation of Compaction Bands: A Digital Poro-Mechanics Approach</b> .....	3478
<i>Chen, X. ; Roshan, H. ; Regenauer-Lieb, K.</i>	
<b>The Petrophysical and Mechanical Properties of Oklahoma's Crystalline Basement</b> .....	3485
<i>Kibikas, W. M. ; Carpenter, B. M. ; Ghassemi, A.</i>	
<b>Physical Modelling on the Cutterhead-Block Interaction During TBM Tunneling</b> .....	3494
<i>Wang, S. F. ; Zhang, Z. X. ; Huang, X.</i>	
<b>Pillarburst Proneness Due to Large-Scale Excavations in Deep Mines (Case Study: The Provence Coal Mine)</b> .....	3500
<i>Ahmed, S. ; Alheib, M. ; Gunzburger, Y. ; Renaud, V.</i>	
<b>Plasticity and Damage Analysis of Berea Sandstone via Cyclic Triaxial Loading Under High Confinement Pressure</b> .....	3507
<i>Mubarak, H. ; Saji, R. P. ; Zhu G. L. R. ; Sousa, R. L. ; Sassi, M. ; Abu Al-Rub, R. K.</i>	
<b>Pore Pressure Response in Rock: Implications of Tensorial Skempton B in an Anisotropic Formation</b> .....	3519
<i>Raaen, A. M. ; Larsen, I. ; Fjær, E. ; Holt, R. M.</i>	
<b>Poroelastic Response of Spherical Indentation – Step Displacement Loading</b> .....	3526
<i>Liu, Ming ; Huang, Haiying</i>	
<b>A Power Function Micro-Creep Model of Salt Rock</b> .....	3536
<i>Li, Huan ; Yang, Chunhe ; Huang, Shuling ; Ding, Xiuli ; Yang, Jie ; Han, Yue ; Xue, Tianfu ; Ma, Changkun</i>	
<b>Practical Approach for Sand-Production Prediction During Production</b> .....	3542
<i>Abbas, Ahmed K. ; Baker, Hussain A. ; Flori, Ralph E. ; Al-Hafadhi, Haider ; Al-Haideri, Najim</i>	
<b>A Practical Approach to a Reliability-Based Stability Evaluation of Precariously Balanced Granite Boulders</b> .....	3551
<i>Vann, J. D. ; Olaiz, A. H. ; Morgan, S. ; Zapata, C.</i>	
<b>Predicting Elastic Properties of Geomechanical Models with Genetic Programming</b> .....	3566
<i>Souza, L. M. S. ; Roehl, D.</i>	
<b>Predicting Fracture Clusters, Cluster Spacing and Perforations of Horizontal Wells Using Data Analytics</b> .....	3574
<i>Alzahabi, Ahmed ; Trindade, A. Alexandre ; Kamel, Ahmed ; Baustian, Wade</i>	
<b>Predicting the Height of Longwall Mining Induced Connective Fracturing and Permeability Enhancement</b> .....	3589
<i>Adhikary, D. P. ; Poulsen, B. A. ; Guo, H.</i>	
<b>A Prediction Model for Extension Limit of Horizontal Drilling Based on Leakage Pressure in Carbonate Formations</b> .....	3598
<i>Li, Xin ; Zhao, Quanmin ; Zhang, Jincheng ; Zeng, Yijin ; Yang, Kaigang ; Yang, Xinxiang</i>	
<b>A Prediction Model for Fracture Pressure in Shallow Stratum of Deep Water Area</b> .....	3605
<i>Wang, Xiaoming ; Chen, Junbin ; Huang, Hai ; Huang, Rui ; Jiang, Xu</i>	
<b>Prediction of Mechanical Stability of Acidizing-Induced Wormholes Through Coupled Hydro-Chemo-Mechanical Simulation</b> .....	3615
<i>Dong, Rencheng ; Wang, Qiqi ; Wheeler, Mary F.</i>	
<b>Prediction of Temperature and Time-Dependent Nonlinear Elastic Properties of Oil Sand Under Thermal Stimulation</b> .....	3622
<i>Gao, Yanfang ; Chen, Mian ; Pang, Huiwen ; Wang, Wenzhi</i>	
<b>Prediction Technique of Coal Seam Rock Mechanical Parameters Based on the Logging Data Box Dimension</b> .....	3630
<i>Danqiong, Li ; Ping, Zhang ; Hansen, Sun ; Rigui, Xia ; Lu, Cheng ; Xiangjun, Liu</i>	

<b>Preliminary Assessment of Primary Stope Performance for a Seismically Active Mine</b> .....	3641
<i>McFadyen, B. ; Grenon, M. ; Morissette, P. ; Woodward, K.</i>	
<b>Pressure Interference Between Fractured Horizontal Wells: Impact of Complex Fracture Growth on Offset Well Pressure Measurements</b> .....	3652
<i>Seth, Puneet ; Shrivastava, Kaustubh ; Kumar, Ashish ; Sharma, Mukul M.</i>	
<b>Production Performance Estimation from Stimulation and Completion Parameters Using Machine Learning Approach in the Marcellus Shale</b> .....	3662
<i>Al-Alwani, M. A. ; Britt, L. ; Dunn-Norman, S. ; Alkinani, H. H. ; Al-Hameedi, A. T. ; Al-Attar, A.</i>	
<b>Propagation of a Planar Hydraulic Fracture Perpendicular to the Isotropy Plane of a Transversely Isotropic Material</b> .....	3676
<i>Moukhtari, F. E. ; Lecampion, B. ; Zia, H.</i>	
<b>Propagation of a Plane-Strain Hydraulic Fracture Accounting for the Presence of a Cohesive Zone and a Fluid Lag</b> .....	3687
<i>Liu, D. ; Lecampion, B.</i>	
<b>Proppant Behavior in Varying Fracture Alignments and Concentration Distributions</b> .....	3696
<i>Yamashiro, B. D. ; Tomac, I.</i>	
<b>Proppant Transport in a Propagating Hydraulic Fracture and the Evolution of Transport Properties</b> .....	3705
<i>Wang, J. ; Elsworth, D. ; Denison, M. K.</i>	
<b>Proppant Transport Studies Using Three Types of Fracture Slot Equipment</b> .....	3716
<i>Kim, Jung Yong ; Jing, Ziming ; Morita, Nobuo</i>	
<b>Puzzles in Tensile Strength Determination of Hard Rocks</b> .....	3728
<i>Serati, M. ; Williams, D. J.</i>	
<b>Quantifying the Reduction in Breakdown Pressure Based on Fluid Saturation</b> .....	3733
<i>Muqtadir, A. ; Elkatatny, S. M. ; Mahmoud, M. A. ; Abdulraheem, A. ; Gomaa, A.</i>	
<b>RAMMS::ROCKFALL - A Modern 3-Dimensional Simulation Tool Calibrated on Real World Data</b> .....	3738
<i>Caviezel, A. ; Lu, G. ; Demmel, S. E. ; Ringenbach, A. ; Bühler, Y. ; Christen, M. ; Bartelt, P.</i>	
<b>Recompletion with Consideration of Depletion Effect in Naturally Fractured Unconventional Reservoirs</b> .....	3746
<i>Bai, Jie ; Sierra, Leopoldo ; Martysevich, Vladimir</i>	
<b>Regional-Scale Implementation of Poroelastic Solutions for Subsidence Analyses</b> .....	3756
<i>Lizárraga, J. J. ; Chandra, K. ; Buscarrera, G.</i>	
<b>Relative Orientations Matter: Behavior of Gas Shale Reservoir with Various Orientations of Wellbore to Bedding Planes</b> .....	3762
<i>Roshankhah, S. ; Mohammadi, K. ; Yu, W. ; Miao, J.</i>	
<b>Research and Evaluation of a Novel Low Friction, High Density and High Temperature Resistance Fracturing Fluids System</b> .....	3768
<i>Wang, Jie ; Yao, Erdong ; Qiu, Yunan ; Zhou, Fujian ; Wang, Zhuang ; Zhang, Le ; Wang, Rui</i>	
<b>Research on Formation Process of SCP and Shape of Compaction Zone in Low Permeability Sandstone</b> .....	3774
<i>Lin, Tiejun ; Mou, Yisheng ; Lian, Zhanghua ; Bao, Xiaomin ; Yu, Hao ; Liu, Yuxuan</i>	
<b>Research on Hydrostatic Pressure Development of a Crack in Rapid Intrusion of High-Pressure Water Flow</b> .....	3785
<i>Yang, Kaigang ; Gao, Deli</i>	
<b>Residual Properties Estimated from Post-Peak Triaxial Unloading: Case Study of a Hard Rock Mine Site</b> .....	3792
<i>Gaines, S. ; Walton, G. ; Labrie, D.</i>	
<b>Retrospective Assessment of Structurally-Controlled Crown Pillar Failures</b> .....	3802
<i>Carter, T. G.</i>	
<b>Review of Historic Records in the Design of Kensico-Eastview Connection Tunnel</b> .....	3818
<i>Temco, Z. R. ; Tsang, W.</i>	
<b>Review of Stimulation and Completion Activities and Trends in the United States Shale Plays: Permian Basin Case Study</b> .....	3826
<i>Al-Alwani, M. A. ; Britt, L. ; Dunn-Norman, S. ; Alkinani, H. H. ; Al-Hameedi, A. T. ; Al-Attar, A.</i>	
<b>Review of the Relation Between Pillar Load and Opening Convergence in Pillar Design Using the Ground Reaction Curve Concept</b> .....	3850
<i>Ray, R. ; Newman, C. ; Agioutantis, Z.</i>	
<b>Revisiting Classical Wellbore Tensile Failure Models with Size Effects</b> .....	3860
<i>Prioul, Romain ; Bérard, Thomas</i>	
<b>Rock Engineering Design Method and Practical Application of Metal Mine in China</b> .....	3868
<i>Ruijun, Zhu ; Runcang, Yu ; Haoyan, Wu. ; Junsheng, Ma. ; Xiuhua, Gu.</i>	

<b>Rock Quality Designation 3D Modelling Using Geostatistics: A Tungsten Portuguese Deposit Case Study</b> .....	3873
<i>Pinheiro, M. ; Sousa, L. ; Miranda, T. ; Pereira, E.</i>	
<b>Rock Strength Degradation Induced by Salt Precipitation: A New Mechanical Mechanism of Sand Production in Ultra-Deep Fractured Tight Sandstone Gas Reservoirs</b> .....	3880
<i>Zhang, Dujie ; Kang, Yili ; You, Lijun ; Xiangchen, Li</i>	

## VOLUME 6

<b>Rock Vibration Characteristics in Vibro-Impact Drilling Based on Fractional Derivative</b> .....	3889
<i>Ji, Z. S. ; Shi, H. Z. ; Song, H. Y. ; Zhao, H. Q. ; Yang, B.</i>	
<b>Role of Friction Reducers on Formation Fluid Flow</b> .....	3899
<i>Wu, J. J.</i>	
<b>RQD Block Modelling for the Identification of a Shear Zone at a Narrow Vein Underground Gold Mine</b> .....	3906
<i>Ramires, J. E. F. ; Campos, M. P. ; Batista, G. A. P. ; Da Silva, J. H. ; Carvalho, A. S. ; Seery, J. M.</i>	
<b>Safe Mud Weight Window Determination: A Case Study from Southern Iraq</b> .....	3912
<i>Abbas, Ahmed K. ; Alhussainy, Shaban D. ; Abdul Hussien, Hassan A. ; Flori, Ralph E.</i>	
<b>Sand Mass Production in True Triaxial Borehole Tests</b> .....	3922
<i>Papamichos, E. ; Walle, L. E. ; Berntsen, A. N. ; Stenebråten, J. F.</i>	
<b>Seismic Driven Geomechanical Studies: A Case Study in an Offshore Gas Field</b> .....	3927
<i>Khatibi, Seyedalireza ; Ostadhassan, Mehdi ; Farzay, Oveis ; Aghajanpour, Azadeh</i>	
<b>Seismic-Scale Self-Affinity of Seismogenic Subsurface Faults and Rupture Dynamics</b> .....	3933
<i>Yuan, R. S. ; Wood, A. M. ; Davison, J. M.</i>	
<b>SEM Investigation of the Fracture Network (Stimulated Reservoir Volume) Induced by Hydraulic Fracturing in Tennessee Sandstone</b> .....	3940
<i>Ratzlaff, C. W. ; Sondergeld, C. H. ; Rai, C. S. ; Curtis, M. E. ; Jernigen, J. D.</i>	
<b>Sensitivity Analysis for Bedding Rock Slope Stability Under Weathering: A Case Study</b> .....	3953
<i>Liu, Dengxue ; Huang, Shuling ; Ding, Xiuli ; Zhang, Yuting</i>	
<b>Shear Behavior of Bedded Salt Interfaces and Clay Seams</b> .....	3961
<i>Sobolik, S. R. ; Buchholz, S. A. ; Keffeler, E. ; Borglum, S. ; Reedlunn, B.</i>	
<b>Shear Dilation in Hydraulic Fracturing: Insight from Laboratory Experiment</b> .....	3971
<i>Feng, Runhua ; Sarmadivaleh, Mohammad</i>	
<b>Shear Strength Characterisation for Very-High Coal Mine Spoil Dumps: Applicability of an Industry-Accepted Framework</b> .....	3977
<i>Bradfield, L. R. ; Fityus, S. G. ; Simmons, J. V.</i>	
<b>Simulation of Buoyancy Effect on the Efficiency of Geothermal Development in Supercritical CO<sub>2</sub>-Based EGS</b> .....	3992
<i>Chen, Y. ; Ma, G. W. ; Wang, H. D. ; Li, T. ; Wang, Y.</i>	
<b>Simulation Study on Heat Extraction in Enhanced Geothermal Reservoirs with Random Fracture Distribution</b> .....	4001
<i>Han, Songcai ; Cheng, Yuanfang ; Gao, Qi ; Yan, Chuanliang ; Wei, Jia ; Zhang, Jincheng</i>	
<b>Sinkhole Susceptibility Assessment of Underground Caves in Soft Rocks by Means of FEM-Based Charts</b> .....	4016
<i>Lollino, P. ; Perrotti, M. ; Fazio, N. L. ; Parise, M.</i>	
<b>Size Scaling and Spatial Clustering of Natural Fracture Networks Using Fractal Analysis</b> .....	4023
<i>Djezzar, Sofiane ; Rasouli, Vamegh ; Boualam, Aldjia ; Rabiei, Minou</i>	
<b>Slow-Slip Evolution of Injection-Induced Shearing on Granite Fracture</b> .....	4035
<i>Sheng, M. ; Xu, Z. ; Li, P. ; Tian, S.</i>	
<b>Sorption of CO<sub>2</sub> and Integrity of a Caprock Shale</b> .....	4043
<i>Agofack, N. ; Cerasi, P. ; Stroisz, A. ; Rørheim, S.</i>	
<b>Spatial-Temporal Evolution of Mining-Induced Fracture Fields in a Gas Burst-Prone Coal Seams</b> .....	4052
<i>Cheng, Zhiheng ; Feng, Jicheng ; Zhao, Zhiyan ; Sun, Fulong ; Wang, Xin</i>	
<b>Stability Analysis of an Underground Limestone Mine Using Terrestrial Laser Scanning with Stochastic Discrete Element Modeling</b> .....	4061
<i>Monsalve, J. J. ; Baggett, J. G. ; Sont, A. ; Ripepi, N. ; Hazzard, J.</i>	
<b>Stability Analysis of Circulating Gas Injection and Extraction in Jintan Salt Cavern Gas Storage</b> .....	4071
<i>Zhang, Yuhao ; Ma, Hongling ; Shi, Xilin ; Li, Huan ; Yin, Hongwu ; Zhang, Shengnan</i>	
<b>Stability Analysis of Drives Excavated in Paste-Filled Stopes for Underhand Mining</b> .....	4086
<i>Soni, A. ; Naik, S. R. ; Ripepi, N.</i>	

<b>Stability Analysis of Lunar Lava Tubes for Permanent Extraterrestrial Habitation</b> .....	4094
<i>Modiriasari, A. ; Theinat, A. K. ; Melosh, H. J. ; Bobet, A.</i>	
<b>Stability of a Rotary Drilling System with Bits Consisting of Full and Partial Blades</b> .....	4102
<i>Tian, Kaixiao ; Detournay, Emmanuel</i>	
<b>Static Proppant Settling Velocity Characteristics in High Viscosity Friction Reducers Fluids for Unconfined and Confined Fractures</b> .....	4112
<i>Ba Geri, M. ; Flori, R. ; Imqam, A. ; Shen, L. ; Bogdan, A.</i>	
<b>Stick-Slip Induced Source Ground Vibration in Sheared Granular Fault</b> .....	4122
<i>Gao, K. ; Rougier, E. ; Guyer, R. A. ; Lei, Z. ; Johnson, P. A.</i>	
<b>Stochastic Determination of Formation Parting Pressure and Dynamic Injectivity for Water Injection</b> .....	4130
<i>Jing, Zhiyi ; Wu, Xingru</i>	
<b>Stochastic Modeling of a Conservative Tracer Test for the Characterization of Fracture Flow Patterns in EGS Collab Experiment 1</b> .....	4140
<i>Wu, H. ; Fu, P. ; Morris, J. P. ; Settgest, R. R. ; Ryerson, F. J. ; Mattson, E. D. ; Hawkins, A. J. ; Zhang, Y.</i>	
<b>Stochastic Prediction of Multi-Well Fracture Connectivity and Application to EGS Collab Experiment 2</b> .....	4146
<i>Frash, L. P. ; Morris, J. P. ; Egs Collab Team, _</i>	
<b>Straddle Packer MicroFrac Testing in High Temperature Unconventional Well: A Case Study in the Bossier/Haynesville Shale</b> .....	4154
<i>Franquet, J. A. ; Moronkeji, D. A. ; Morton, J.</i>	
<b>Stress Determination from Logs. Why the Simple Uniaxial Strain Model is Physically Flawed but Still Gives Relatively Good Matches to High Quality Stress Measurements Performed on Several Fields Offsho...</b> .....	4166
<i>Andrews, J. S. ; De Lesquen, C.</i>	
<b>Stress Distribution in Ordovician Carbonate Rocks of the Tuofutai Region in the Tahe Oilfield</b> .....	4177
<i>Liu, Zhiyuan ; Yan, Yujie ; Song, Zhifeng ; Mao, Haijun ; Yang, Chunhe</i>	
<b>Stress Reduction in Bounding Shales of Depleted Unconsolidated Reservoir Sands – a Case for Shale Pore Pressure Depletion</b> .....	4187
<i>Enyioha, C. ; Lin, M. ; Mikulencak, D.</i>	
<b>Stress State Estimation Based on Local Variations of Effective Elastic Moduli Caused by Presence of Critically Stressed Fractures</b> .....	4194
<i>Dubinya, N. V.</i>	
<b>A Study of Open-Hole Extended-Reach Limit of a Horizontal Well in Natural Gas Hydrate Formation Considering the Wellbore Circulating Temperature Profile</b> .....	4204
<i>Zhang, H. ; Tan, T. ; Li, J. ; Zhang, S. ; Deng, Q. ; Wang, H. ; Cai, Z. ; Yu, Q. ; Yang, M. ; Chen, Y. ; Liu, K.</i>	
<b>Study of Plastic and Creep Deformation of Shale Rocks with a Micro-Mechanics Based Approach</b> .....	4208
<i>Farhat, F. ; Xie, S. ; Shao, J. F. ; Pourpak, H. ; Su, K.</i>	
<b>Study of Poroelastic Deformation in Soft Elastic Granular Materials During Repetitive Fluid Injection</b> .....	4214
<i>Hosseini Zadeh, A. ; Jeon, M.-K. ; Kwon, T.-H. ; Kim, S.</i>	
<b>Study of the Physico-Chemical Changes in Synthetic Carbonate Rocks Submitted to Injection of Reactive Fluids</b> .....	4222
<i>Oliveira, A. D. ; Melo, L. M. ; Guimarães, L. J. ; Amorim, A. F. ; Oliveira, S. M. F. ; Gomes, I. F.</i>	
<b>Study on Failure Features of Natural Fracture During Hydraulic Fracture Approaching</b> .....	4228
<i>Han, Songcai ; Cheng, Yuanfang ; Gao, Qi ; Ding, Jiping ; Li, Yang ; Yan, Chuanliang ; Zhang, Jincheng</i>	
<b>Study on Temperature-Time Effect Characteristics of Hard Rock Under Long-Term Load</b> .....	4241
<i>Zhang, Longyun ; Yang, Shangyang</i>	
<b>Study on the Flow Mechanism Simulation of Deep Shale Propped Fractures in Sichuan Basin</b> .....	4246
<i>Lu, C. ; Huang, C. H. ; Chen, C. ; Guo, J. C. ; Xu, X. ; Feng, Q. ; Xiao, Y. J. ; Liu, W.</i>	
<b>Study on the Influence of Conglomerate Meso-Structures Characteristics on Crack Propagation</b> .....	4258
<i>Yan, Yu ; Zhang, Guangqing ; Li, Shiyuan ; Nie, Yuanxun</i>	
<b>Study on the Open-Hole Extended-Reach Limit Model Analysis for Offshore Reelwell Drilling Method</b> .....	4264
<i>Li, J. ; Tan, T. ; Zhang, H. ; Deng, Q. ; Wang, H. ; Cai, Z. ; Yu, Q. ; Yang, M. ; Chen, Y. ; Liu, K.</i>	
<b>Subsurface Monitoring via Physics-Informed Deep Neural Network Analysis of DAS</b> .....	4271
<i>Sherman, C. S. ; Mellors, R. J. ; Morris, J. P.</i>	
<b>The Supercritical CO<sub>2</sub> Fracturing Experimental Study on Fracture Initiation of Different Rocks</b> .....	4278
<i>Yang, Bing ; Wang, Haizhu ; Shen, Zhonghou ; Lu, Qun ; Zheng, Yong ; Shi, Lujie</i>	
<b>Super-Critical CO<sub>2</sub> Weakening Effect on Strength of Tight Sandstone With a Weak Plane: Experimental Results and Causes</b> .....	4296
<i>Zhang, Guangqing ; Yuanxun, Nie ; Bai, Xiaohu</i>	

<b>Synthetic Polypropylene Fiber Content Influence on Cement Strength at High-Temperature Conditions</b> .....	4303
<i>Mahmoud, Ahmed Abdulhamid ; Elkhatmy, Salaheldin</i>	
<b>System Reduction for Fractured Media Using Machine-Learning</b> .....	4308
<i>Srinivasan, S. ; Karra, S. ; Hyman, J. D. ; Viswanathan, H. S. ; Srinivasan, G.</i>	
<b>A Systematic Approach to Correlate Experimental Stress and Damage Measures for Hard Rock</b> .....	4312
<i>Bruning, T. D. ; Karakus, M. ; Nguyen, G. D. ; Goodchild, D.</i>	
<b>Technology for Monitoring Wetting Range of True-Triaxial Coal Seam Water Injection Based on Acoustic Emission Array</b> .....	4319
<i>Cheng, Weimin ; Chen, Jian ; Wang, Gang ; Fan, Jiuyuan ; Hu, Yanwei</i>	
<b>Temperature Effects on Nano-Micro- Scale Fracture of Pure Calcium Carbonate Using Molecular Dynamics</b> .....	4329
<i>Mosharafī, M. ; Mahbaz, S. B. ; Dusseault, M. B.</i>	
<b>Tensile Behaviors of Granite: Grain Scale Cracking and Fracture Process Zone</b> .....	4337
<i>Kong, Lie ; Gamage, Ranjith Pathegama ; Zhao, Jinzhou ; Rathnaweera, Tharaka ; Ma, Zhaoyang</i>	
<b>Tensile Strength of the Interface Between Cement and Shale Caprock and the Mechanism of Strength Development</b> .....	4348
<i>Stroisz, A. M. ; Gawel, K. ; Bjørge, R. ; Cerasi, P. R.</i>	
<b>Thermodynamic-Consistent Adsorption-Swelling Models for Coal</b> .....	4355
<i>Zhang, Yida</i>	
<b>Thermomechanical Analysis of the Long-Term Barrier Integrity in Bedded Salt Formation</b> .....	4362
<i>Liu, Wenting ; Eickemeier, Ralf ; Fahland, Sandra</i>	
<b>THM Modeling of Poroelastic Sustainability of Hydraulic Fracture in CO<sub>2</sub> Storage Reservoirs</b> .....	4369
<i>Fu, P. ; Ju, X. ; Huang, J. ; Settgest, R. R. ; Morris, J. P.</i>	
<b>A Three Dimensional Fracability Model Integrated with Cuttings-Core-Wellbore-Reservoir Multiscal Parameters: A Case Study of a Tight Sandstone Reservoir</b> .....	4375
<i>Zhu, Haiyan ; Tao, Lei ; Liu, Dongqiao ; Liu, Qingyou ; Zhang, Binhai ; Peng, Chengyong ; McLennan, John</i>	
<b>Threshold Horizontal Stress Contrast for Fully Cemented Natural-Fracture Reactivation: Dependence on Intersection Angle and Initial Reservoir Pressure</b> .....	4386
<i>Haddad, M. ; Eichhubl, P. ; Laubach, S.</i>	
<b>Tiltmeter Monitoring to Verify Growth of Hydraulic Fractures Used for Preconditioning of Strong Roof Rock</b> .....	4393
<i>Kasperczyk, D. ; Chen, Z. ; Jeffrey, R. G. ; Pandurangan, V.</i>	
<b>Experimental Study on Shear Characteristic of Filling Rock Joints Under Constant Normal Load Conditions</b> .....	4399
<i>Deng, H. ; Cao, P. ; Lin, Q.</i>	
<b>Tracking Convergence, Spalling, and Cutter Roof Formation at the Pleasant Gap Limestone Mine Using LiDAR</b> .....	4405
<i>Slaker, B. ; Murphy, M. ; Winfield, J.</i>	
<b>Transient Effects of Leak-off and Fracture Ballooning on Mud Loss in Naturally Fractured Formations</b> .....	4415
<i>Dokhani, V. ; Ma, Y. ; Li, Z. ; Geng, T. ; Yu, M.</i>	
<b>Transient Solids Production: Analytical Approach</b> .....	4424
<i>Geilikman, M. B.</i>	
<b>Tunneling in Rock for Chicago's Albany Park Stormwater Diversion Tunnel</b> .....	4432
<i>Vardakos, Sotirios ; Mark Step Hani ; Frank Jaramilla ; Hernandez, Michaelangelo</i>	
<b>Ultrasonic Precursors to Shear Failure of Rock Joints in Gosford Sandstone with Rough Contact Surfaces</b> .....	4440
<i>Gheibi, Amin ; Hedayat, Ahmadreza</i>	
<b>Uncertainty of Fracture Intensity Measurement in Discontinuous Rock Masses – a Sampling Window Approach</b> .....	4449
<i>Lu, Y. C. ; Tien, Y. M. ; Juang, C. H.</i>	
<b>Uncertainty Quantification and Reduction Through Data Assimilation Approaches for the Geomechanical Modeling of Hydrocarbon Reservoirs</b> .....	4457
<i>Gazzola, L. ; Ferronato, M. ; Frigo, M. ; Janna, C. ; Teatini, P. ; Zoccarato, C. ; Antonelli, M. ; Corradi, A. ; Dacome, M. C. ; Mantica, S.</i>	
<b>Uncertainty Reduction in Constructing the Mechanical Earth Model Using Artificial Neural Network: Case Study from Egypt's Western Desert</b> .....	4468
<i>Algarhy, A. ; Dubey, A.</i>	
<b>Underground Ground Deformation Monitoring – A User Friendly Approach</b> .....	4483
<i>Van Eck, D. R. ; Berghorst, A.</i>	



<b>Underground Rock Dissolution and Geomechanical Issues</b> .....	4489
<i>Laouafa, F. ; Guo, J. ; Quintard, M.</i>	
<b>Understanding Non-Aqueous Phase Liquid Contaminant Leaking Into Subsurface Using FEM</b> .....	4501
<i>Yu, W. ; Li, H. ; Cai, S. M. ; Wang, B.</i>	
<b>Uniaxial Strain Unloading Compressibility of Frio Sand: Measurements and Implications on Reservoir Pressure Management for CO<sub>2</sub> Storage</b> .....	4511
<i>Zheng, Xiaojin ; Sun, Zhuang ; Espinoza, Nicolas D.</i>	
<b>Use of B Factor from Major Geological Faults' Orientation on Mathews' Stability Graph Method. a Case Study.</b> .....	4518
<i>Azorin, J. L. ; Vallejos, J. A. ; Miranda, R. J. ; Mondaca, M. ; Garrido, C. ; Catalan, O.</i>	
<b>Using an Analytical Model to Predict Collapse Volume During Drilling: A Case Study from Southern Iraq</b> .....	4525
<i>Abbas, Ahmed K. ; Manhalawi, Asmaa ; Alameedy, Usama ; Flori, Ralph E.</i>	
<b>Using Roughness of Excavated Rock Surface to Predict Cutting Forces: A Numerical Approach</b> .....	4534
<i>Ayawah, P. E. ; Gertsch, L. S. ; Sherizadeh, T.</i>	
<b>Utilization of Sidewall Plugs for Enhancing Rock Characterization</b> .....	4543
<i>Govindarajan, S. ; Gokaraju, D. V. ; Mitra, A. ; Thombare, A. ; Guedez, A. ; Ghoneim, T. ; Patterson, R. ; Aldin, M.</i>	
<b>The Variation of Grain Size Distribution (GSD) in the Rock Granular Matters with Mass Migration and Loss in the Seepage Process</b> .....	4551
<i>Kong, Hailing ; Wang, Luzhen ; Xu, Guizhong ; Qiu, Chengchun ; Xu, Bing ; Zhang, Dan</i>	
<b>Variation of the Least Principal Stress with Depth and Its Effect on Vertical Hydraulic Fracture Propagation During Multi-Stage Hydraulic Fracturing</b> .....	4556
<i>Xu, S. ; Singh, A. ; Zoback, M. D.</i>	
<b>Variations of the Property of High Temperature Granite Treated with Liquid Nitrogen</b> .....	4563
<i>Huang, Pengpeng ; Huang, Zhongwei ; Yang, Zheqi ; Yang, Ruiyue ; Wu, Xiaoguang</i>	
<b>Viscous Drag During Gravitational Sinking of Brittle Anhydrite Stringers in Zechstein Salt Above the Groningen Field Could Cause Minor Earthquakes</b> .....	4572
<i>Li, Shiyuan ; Urai, Janos L. ; Zhang, Guangqing</i>	
<b>Visualization Study of Hydraulic Fracture Propagation in Unconsolidated Sandstones</b> .....	4578
<i>Chen, Lei ; Zhang, Guangqing ; Lyu, Yanjun ; Li, Zhaoxing ; Zheng, Xuelin</i>	
<b>Wall-Retardation Effect on Proppant Settling Velocity in Fractures: Experimental Study and Model Development</b> .....	4584
<i>Zhu, Zhaopeng ; Xu, Zhengming ; Song, Xianzhi</i>	
<b>Well Integrity of High Temperature Wells: Effect of Mineralogical Changes on Mechanical Properties of Well Cement</b> .....	4592
<i>Terhegge, J. H. ; Wollenweber, J. ; Naumann, Marcel ; Pipilikaki, P. ; Vercauteren, F.</i>	
<b>Well Track Optimization of Multi-Branch T-Shaped Well in Coal Seam</b> .....	4601
<i>Meng, S. Z. ; Wu, A. A. ; Yang, G. ; Hou, B.</i>	
<b>Wellbore Stability Analysis Using an Elasto-Plastic Mogi-Coulomb Model</b> .....	4608
<i>Kamgue Lenwoue, A. R. ; Deng, J. ; Liu, W. ; Li, H. ; Palencia Yrausquin, E. ; Matamba, G.</i>	
<b>Wellbore Stability and Possible Geomechanical Failure in the Vicinity of the Well During Pressurization at the Gas Hydrate Deposit in the Ulleung Basin</b> .....	4618
<i>Kim, Jihoon ; Lee, Joo Yong</i>	
<b>Wellbore Strengthening Analysis in Single and Multi-Fracture Models Using Finite Element and Analytical Methods, Case Study: South Pars Gas Field</b> .....	4625
<i>Mehrkhani, Farzad ; Ebrahimabadi, Arash ; Alaei, Mohamad Reza</i>	
<b>Will Using LSASF Affect the Rock Properties of Sandstone and Increase Oil Recovery?</b> .....	4641
<i>Hasan, Al-Saedi N. ; Ralph, Flori E. ; Qasim, A. K.</i>	
<b>Author Index</b>	