

THURSDAY JUNE 30

| Paper ID | Title | Authors |
|----------------|---|------------------|
| 8:45 AM | Welcome | Bill Dershowitz |
| | Opening Keynote | |
| | Emergent Flow Phenomena from Fracture Coalescence, Branching and Network Geometry | Hari Viswanathan |

DFN FUNDAMENTALS I

| Paper ID | Paper Title | Authors |
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| 10:20 | 91 Creating simulation model permeability in fractured impermeable rocks using DFN modeling at the | Sherilyn Williams-Stroud; Lee, Si-Yong; Zaluski, Wade |
| 10:40 | 61 Development of a 3D geotechnical model and discrete fracture network approach for a review of da | Felicia M Weir (PSM)*; Richard Brehaut (PSM); Garry Mostyn (PSM) |
| 11:00 | 63 Conditioning of DFN models to fracture trace maps and borehole intersections | Tomas Bym (WSP)*; Robert Turnbull (WSP); Lee Hartley (WSP) |
| 11:20 | 65 Processing and conversion of raw point-cloud laser measurements and auxiliary data of rough-surfa | Brandon Stock (Stockholm University)*; Andrew Frampton (Stockholm University) |
| 11:40 | 74 Quantifying Connectivity of Fracture Networks: A Lacunarity Approach | Ankur Roy (Indian Institute of Technology Kharagpur)*; Sivaji Lahiri (Central Institute of Mining and Fuel Research) |

DFN Oil & Gas I

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| 10:20 | 31 Incorporating the Variability of Uncertain DFN Model Parameters of a Hydraulically Fractured Reser | Francis Nwabia (University of Alberta)*; Juliana Leung (University of Alberta) |
| 10:40 | 56 A Computationally Efficient Fracturing-Production Simulator For Naturally Fractured Reservoirs | Meng Cao (The University of Texas at Austin)*; Mukul Sharma (The University of Texas at Austin) |
| 11:00 | 57 FRACTURE DETECTION AND PREDICTION USING SUBSURFACE DATA AND RESERVOIR ANALOG | sofiane djeddar (University of North Dakota)* |
| 11:20 | 85 Discrete Fracture Network Modeling of a Giant, Naturally Fractured Carbonate Reservoir, Korolev Fi | Evan Earnest (Chevron)* |
| 11:40 | 67 Numerical simulation of 3D digital core resistivity in fractured shale reservoir | Xing Qin (SINOPEC Research Institute of Petroleum Engineering)*; Yanlong Zhao (China University of Petroleum Beijing at Karamay) |

| 12:00 PM | Workshop I | Lead | Panelists |
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| | The Challenges of Multiscale and Multisource data integration in the | Sergio Sarmiento | Martin Stiggson, ; Mukul Sharma; Sherilyn Williams-Stroud; Evan Earnest; Felicia Weir |

DFN Mining

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| 1:20 | 89 Using DFN Logic in Open Pit Stability Analysis Applications for calibration and predictive calculation i | Edgar E Montiel (SRK)* |
| 1:40 | 62 DFN characterization and block size assessment of a fault zone at a long wall coal mine in the Newca | Felicia M Weir (PSM)*; Mark Fowler (PSM); Madelin Kobler (PSM) |
| 2:00 | 73 Probabilistic Step-Path Slope Stability Analysis Using Spatially Constrained DFN Models – A Case Stud | Kamran Esmaeili (University of Toronto)* |
| 2:20 | 80 Controlled lab-scale evaluation of the secondary permeability represented in a 3D printed Discrete F | Marie-Helene Fillion (Laurentian University)*; Mark Baidoo (Laurentian University); Alexander Hutcheon (Mirarco Mining Innovation); Claudia Gonzalez (BBA) |
| 2:40 | 84 Use of stochastic DFN-DEM modelling for overall and inter-ramp slope stability analysis | Lewis N Mathe (University of Johannesburg); Maria Ferentinou (Liverpool John Moores University); Kamran Esmaeili (University of Toronto)* |
| 3:00 | 66 Remaining issues of DFN – (1) Discrepancy between Geologic Fractures and Conductive Fractures | Masahiro Uchida (Fracture Flow Solutions)* |

DFN Oil & Gas II

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| 1:20 | 87 Natural and Hydraulic Fracture Interaction: A Proxy for Tracking Flow Trajectory | Sergio Sarmiento (Independent Consultant)*; Natalia Makedonska (Los Alamos National Laboratory) |
| 1:40 | 88 FracMan / dfnWorks: Translating Geological Fracture Characterizations for Massively Parallel Subsu | Associates) |
| 2:00 | 69 Modeling Fractures with Stochastic Discrete Fracture Network: Hassi-Messaoud Field Case Study | sofiane djeddar (University of North Dakota)*; Aldjia Boualam (University of North Dakota) |
| 2:20 | 71 Nonlinear flow model for rock fracture intersections and the roles of the intersecting angle, aper tur | Jie Liu (Northeastern University)*; Zhechao Wang (Northeastern University); Liping Qiao (Northeastern University) |
| 2:40 | 77 Numerical investigation of the critical pumping rate to create complex fracture networks in shale oil | Dan Xu (China University of Petroleum, Beijing); Yan Jin (China University of Petroleum, Beijing); Shiming Wei (China University of Petroleum, Beijing)*; Xiaobing Bian (Sinopec Research Institute of Petroleum Engineering) |
| 3:00 | 58 3D FRACTURE MODELING: APPLICATION ON TIGHT OIL RESERVOIR | sofiane djeddar (University of North Dakota)*; Aldjia Boualam (University of North Dakota) |
| 3:20 | 90 Optimization design of horizontal well fracture stage placement in shale gas reservoirs based on an | Guoxiang Zhao (China University of Petroleum, Beijing)* |

DFN NUCLEAR

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| 4:00 | 29 Long-Term Density-Dependent Groundwater Flow Analysis and its Effect on Nuclide Migration for Se | Young-Jin Park (University of Waterloo)*; Atsushi Sawada (Japan Atomic Energy Agency); Takenori Ozutsumi (Obayashi Corporation); Tatsuya Tanaka (Obayashi Corporation); Shuji Hashimoto (EMG Inc.); Yutaka Morita (Geoscience Research Laboratory) |
| 4:20 | 64 A workflow for generation of high quality meshes for modelling near-field THMC processes in poro | Kyle Mosley (Golder/WSP)*; Lee Hartley (Golder/WSP); Robert Turnbull (Golder/WSP); Simon Libby (Golder); Mark Cottrell (Golder/WSP); Tomas Bym (Golder/WSP); Neal Josephson (Golder/WSP); Carl Gable (LANL); Jeffrey Hyman (LANL); Natalia Makedonska (Los Alamos National Laboratory); Daniel Livingston (LANL) |
| 4:40 | 59 A universal elliptical disc (UED) model to construct discrete fracture network and its size and azimut | Jun Zheng (Zhejiang University)*; Jichao Guo (Zhejiang University); Qing Lü (Zhejiang University); Jianhui Deng (Sichuan University) |
| 5:00 | 70 Multiple Continuum Approach to Modeling Radionuclide Transport in Fractured Networks | Rosemary Leone (Sandia National Laboratories)*; Michael Nole (Sandia National Laboratories); Glenn Hammond (Pacific Northwest National Laboratory); Peter Lichtner (University of New Mexico) |
| 5:20 | 78 Effects of Fracture Transmissivity Relationship on Repository Performance Characteristics | Mariah Smith (Sandia National Labs)*; Teresa Portone (Sandia National Laboratories); Laura Swiler (Sandia National Labs) |

5:40 83 Analysis of the characteristics of particle trajectories in DFN and consequences on travel time distribution (Univ. Rennes, CNRS); Jan-Olof Selroos (SKB)
 Romain Le Goc (Itasca Consultants SAS)*; Caroline Darcel (Itasca Consultants SAS); Philippe Davy

FRIDAY JULY 1ST

| Paper ID | Title | Authors |
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| 9:00 AM | Keynote Influence of Fracture Networks on Engineered Geothermal Systems (EGS) Performance | Thomas Doe |

DFN Civil and FUNDAMENTALS II

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| 10:20 | 79 Fracture intensity modelling in rock slopes and field representativeness evaluation using discrete fracture networks | Omar Andres Rosada Gonzalez (Universidad Nacional de Colombia - Bogotá)*; Rodrigo Hernández Carrillo (Universidad Pontificia Bolivariana); Gloria Beltran (Universidad Nacional de Colombia) |
| 10:40 | 86 Analyzing Anisotropy in Fracture Networks: A Flow Simulation Approach | Ajay Sahu (Indian Institute of Technology Kharagpur); Ankur Roy (Indian Institute of Technology Kharagpur)* |
| 11:00 | 60 DFN Modelling for a Shallow Cover Road Tunnel System | Felicia M Weir (PSM)*; James Watton (PSM) |
| 11:20 | 72 Hydraulic Characterization of Fractures for DFN Modeling of Dam Foundation Rock Mass | Takako Miyoshi (Kajima Corporation)*; Masayuki Ishibashi (Kajima Corporation); Kazuhiko Masumoto (Kajima Corporation) |
| 11:40 | 76 Slope Stability Analyses of a Former Chalk Quarry Wall, Kent, United Kingdom | David Ingram (Arup)*; James Bottomley (Arup); Ioannis Vazaios (Arup) |
| 12:00 | 68 Rock Image Segmentation Based on Improved BP Neural Network 2 | Xing Qin (SINOPEC Research Institute of Petroleum Engineering)*; Yanlong Zhao (China University of Petroleum Beijing at Karamay) |

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| 12:30 PM | Workshop II Coping with Fracture Size | Lead Sherilyn Williams-Stroud | Panelists Omar Gonzalez, Sofianne Djeddar, Sergio Sarmiento, Thomas Bym, Jun Zheng, |
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POSTERS

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| 81 | Discrete Fracture Network modeling and characterization of Deadwood and Red River formations to Jeres Porlles Hurtado (UND)*; Hadi Jabari (University of North Dakota) | Martin Stigsson (SKB)* |
| 82 | How Structural Uncertainties Affect Flow and Tracer Transport Through Rock Fractures | Vuong Van Pham; Amirmasoud Kalantari Dahaghi; Sherilyn Williams-Stroud; Aydin Babakhani; |
| 92 | Title: i-Geo Sensing Fracture Diagnostic (i-GSFD) platform | William Fincham; William Fincham |