



INTERNATIONAL
GEOMECHANICS
SYMPOSIUM

INTERNATIONAL GEOMECHANICS SYMPOSIUM

30 OCTOBER–2 NOVEMBER 2023

AL KHOBAR, SAUDI ARABIA

WELCOMING OUR 2023 SPONSORS

Hosted By & Diamond

أرامكو السعودية
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Academic Partner



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Gold



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Delegate Gift



Luncheon



Student & Academia



Coffee Break



ORGANIZERS

Hosts





INTERNATIONAL GEOMECHANICS SYMPOSIUM

30 OCTOBER–2 NOVEMBER 2023

AL KHOBAR, SAUDI ARABIA

DAY 1

IGSEVENT.ORG

29 OCTOBER 2023, SUNDAY

FIELD TRIP

- 8:00 - 11:30 **DAMMAM DOME FIELD TRIP**
Capacity: Max 50 persons
- 8:00 - 11:30 **DHAHRAN TECHNO VALLEY FIELD TRIP**
Capacity: Max 60 persons
- 8:00 - 11:30 **SHORT COURSE AT KING FAHD UNIVERSITY OF PETROLEUM & MINERALS (KFUPM)**
- 13:00 - 15:00 **KING FAHD UNIVERSITY OF PETROLEUM & MINERALS (KFUPM) ACTIVITIES - (OPEN TO EVERYONE)**
Educator Forum on "Opportunities and Challenges in Sustainable Energy Supply"
- CAMPUS TOUR - MORE INFORMATION TO FOLLOW SOON**

30 OCTOBER 2023, MONDAY

- 8:00 - 9:00 **ONSITE REGISTRATION**
- 9:00 - 9:05 **HSE BRIEFING**
- 9:05 - 9:15 **COMMITTEE CHAIRS WELCOME**
- 9:15 - 9:30 **OPENING SPEAKER**
- FELLOW 1**
9:30 - 10:30 **Priscilla P. Nelson, Colorado School of Mines**
Underground Resources for a Sustainable Future
- 10:30 - 11:10 **MODERATED DISCUSSION**
- 11:10 - 11:25 **COFFEE BREAK - 15 MIN**
- FELLOW 2**
11:25 - 12:25 **Maurice B. Dusseault, University of Waterloo**
Subsurface Energy Storage Geomechanics
- 12:25 - 13:05 **MODERATED DISCUSSION**
- 13:05 - 14:05 **LUNCH - 1 HR**
- FELLOW 3**
14:05 - 15:05 **John McLennan, University of Utah**
15:05 - 15:45 **MODERATED DISCUSSION**
- 15:45 - 16:00 **COFFEE BREAK - 15 MIN**
- KEYNOTE | VIRTUAL**
16:00 - 16:25 **Mark Zoback**
The Geomechanical Challenges of Massive Scale CO2 Sequestration
- 16:25 - 16:40 **MODERATED DISCUSSION**
- 18:00 - 20:00 **Gala Dinner, Sponsored by Exploration Department, Saudi Aramco with Sponsor Recognition**



INTERNATIONAL GEOMECHANICS SYMPOSIUM

30 OCTOBER–2 NOVEMBER 2023

AL KHOBAR, SAUDI ARABIA

DAY 2
IGSEVENT.ORG

31 OCTOBER 2023, TUESDAY

SESSIONS 1, 2 & 3 (CONCURRENT)

7:30 - 8:30 **ONSITE REGISTRATION**
8:30 - 8:50 **OPENING SPEAKER**
8:50 - 10:05 **PRESIDENT'S PANEL**
Moderator: Gang Han
10:05 - 10:15 **GROUP PHOTO**
10:15 - 10:30 **COFFEE BREAK - 15 MIN**

10:30 - 11:50 **SESSION 1: CO2 SEQUESTRATION & UTILIZATION**

Session Chairs:

STREAM 1

Frédéric Amour, Danish Offshore Technology Centre

Carbon storage in depleted Danish chalk reservoirs: characterising the shear and vertical deformation at the field scale and in the near-wellbore area

Ikhwanul Hafizi Musa, Petronas

Pragmatic Methodology for Evaluation of Geomechanical Risks During Feasibility Assessment of Fields in Offshore Peninsular Malaysia for CO2 Geological Storage

Clement Joulin, Net-Zero Geosystems

A THMC Coupled Open-Access Well Integrity Tool to Study Legacy Wells Re-Purposed for CO2 Injection

Dave Davies, Rockfield Global

Using ELFEN Horizon to assess geomechanical response of ExxonMobil's GoM ST54 field due to CO2 injection

11:50 - 12:50 **LUNCH - 1 HR**

10:30 - 11:50 **SESSION 2: FUNDAMENTAL GEOMECHANICS**

Session Chairs:

STREAM 2

Chee Phuat Tan, Petronas

Successful Pilot Deployment of Wellbore Strengthening Design Criteria and Quantification of Enhanced Fracture Gradient in a Depleted Reservoir in Malay Basin

Lang Liu, University of Alberta

Indication of In-situ Biaxial Stress from Pressuremeter Hold Test

Bruno Sergio Pimentel de Souza, Petrobras

The temperature effect on gradient fracture in well containment analysis

Abbas Khaksar, Baker Hughes

Integrating Fibre Optic Surveys with Petrophysics and Geomechanics for Sand Control Decisions in a Brown Field

11:50 - 12:50 **LUNCH - 1 HR**



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30 OCTOBER–2 NOVEMBER 2023

AL KHOBAR, SAUDI ARABIA

DAY 2
IGSEVENT.ORG

31 OCTOBER 2023, TUESDAY

SESSION 1, 2 & 3 (CONCURRENT)

10:30 - 11:50

SESSION 3: FUNDAMENTAL GEOMECHANICS

Session Chairs :

STREAM 3

Durga Acharya, Tribhuvan University

Impact of rock structure on Tensile Strength and Mode of Rupture

Rafał Skupio, Oil and Gas Institute - National Research Institute

Computed tomography and dynamic elastic parameters analysis of salt samples

Skaow Kusolsong, PTTEP

UPVC test design, interpretation, and simulation for compaction and subsidence

Arpita Pal Bathija, Aramco Americas

Advanced performance evaluation of cement sheath

11:50 - 12:50

LUNCH - 1 HR

SESSIONS 4, 5 & 6 (CONCURRENT)

12:50 - 14:30

SESSION 4: GEOMECHANICS FOR GEOTHERMAL & NEW ENERGIES

Session Chairs :

STREAM 1

Jawad Rafiq, King Fahd University of Petroleum and Minerals (KFUPM)

Unveiling the Potential Geothermal Reservoir in Al-Lith, Saudi Arabia: An Integrated Geologic, Remote Sensing, Geochemical, and Hydrochemical Approach

Daffa Arrofi, King Fahd University of Petroleum and Minerals (KFUPM)

Integrating Multiparameter Geological Remote Sensing Analysis to Delineate the Jizan Geothermal Reservoir, Southwestern Saudi Arabia

Yuedu Chen, Taiyuan University of Technology

Thermal performance of a heterogeneous fracture in geothermal reservoirs caused by multi-wells alternating injection and production

Elsa Maalouf, American University of Beirut

Assessing the Role of PCM in Enhancing the Performance of Coaxial Geothermal Wells

Jennifer Market, GeoActive

Multi-Discipline Geomechanics Techniques: Sharing Best Practices Amongst Hydrocarbon, Mineral Mining, Geothermal, and CCUS Geoscientists

14:30 - 14:40

COFFEE BREAK - 10 MIN



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IGSEVENT.ORG

31 OCTOBER 2023, TUESDAY

SESSIONS 4, 5 & 6 (CONCURRENT)

12:50 - 14:30

SESSION 5: PETROLEUM GEOMECHANICS

Session Chairs :

STREAM 2

Alexander Rozhko, Equinor ASA

Geomechanical modeling of cooling-induced 4D time-shifts in Johan Sverdrup Field: implications for wellbore trajectories optimization

Khamitov Furkhatac, Nazarbayev University

Discrete element modelling of deep cemented sandstone formation using adhesive elasto-plastic contact model

Behzad Hosseinzadeh, Technical University of Denmark

Impact of Thermo-Hydro-Mechanical-Chemical Coupling on Fluid Flow and Deformation during Water Injection in Chalk Reservoirs

Izzati M Haata, Petronas

Shale and Sand Pore Pressure Disequilibrium – challenges and mitigation strategy

Nik Fadhlan, Petronas

High Temperature influence in Pore Pressure Prediction – Case Study in Offshore Malaysia

14:30 - 14:40

COFFEE BREAK - 10 MIN

12:50 - 14:30

SESSION 6: DRILLING GEOMECHANICS

Session Chairs :

STREAM 3

Mohamed Fouda, Halliburton

Innovative Techniques for Wellbore Stability Evaluation Using Logging-While-Drilling Technologies

Henry Galvis Silva, Texas A&M University

Optimizing Fishbone Multilateral Well Productivity Forecasting With Machine Learning

Ahmed Bahgat, EXCELLENCE LOGGING

Advanced Hole Cleaning Monitoring in Real-time Improves Drilling performance in Highly Deviated and Horizontal MRC (Maximum Reservoir Contact) Wells Drilled in the Lower Cretaceous Formations.

Li Qiuguo, Saudi Aramco

Poroelastic and Thermoelastic Considerations in Maximum Horizontal Stress Determination from Wellbore Failures

Ivan Diaz-Granados, SLB

How to make better decisions by capturing uncertainty in geomechanical wellbore models for drilling applications

14:30 - 14:40

COFFEE BREAK - 10 MIN



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31 OCTOBER 2023, TUESDAY

ALL POSTER SESSIONS (CONCURRENT)

14:40 - 15:10 **POSTER SESSION 1: CO2 SEQUESTRATION AND UTILISATION**

Session Chairs :

Akihisa Takahashi

Detection of Geomechanical Reservoir Deformation in CCS

Kun Su

Possible scenarios of CO2 injection through a thermal induced fracture predicted by an analytical mode

Omar Bakelli

Geomechanical Characterization of the Broom Creek Reservoir for Carbon Capture & Storage in the Williston Basin, North Dakota

STREAM 1

14:40 - 15:10 **POSTER SESSION 3: SUBSURFACE HYDROGEN AND ENERGY STORAGE**

Session Chairs :

Rimsha Rais

Subsurface Hydrogen Storage in depleted wells of Balkasar, Filmkasar Fields, Upper Indus Basin, Pakistan.

Mustafa Sari

Petrophysical characterisation and geomechanical testing of rock slat as potential geostorage of hydrogen in Western Australia

Klemens Katterbauer

Deep learning uncertainty quantification approach for liquid hydrogen storage analysis

STREAM 3

14:40 - 15:10 **POSTER SESSION 2: GEOMECHANICS FOR GEOTHERMAL & NEW ENERGIES**

Session Chairs :

Aimene Aihar

Harnessing Geothermal Energy: The Emerging Role of Fishbone Drilling in EGS Development

Jerome Sfeir

Enhanced Geothermal Systems: A Sensitivity Analysis of Critical Performance Factors

Zhihong Zhao

Combining geothermal doublet system with aquifer thermal energy storage system

STREAM 2

14:40 - 15:10 **POSTER SESSION 4: PETROLEUM GEOMECHANICS**

Session Chairs :

Ruqaya Al Zadjali

Geomechanical Modelling to Assess Cap Rock Integrity for a Thermal EOR Development

Najwa Fayyaz

An integrated approach to Petroleum Geomechanics for 3D unconventional reservoir characterization, well integrity and hydraulic fracturing by using drilling operations, seismic modelling, paleo-stress fracture monitoring techniques in Potwar Plateau, NW Himalayas, Pakistan

STREAM 4

Ruud Weijermars

Leak-off in Microfractures and Fluid Storage in Principal Fractures during Fracking Operations in Shale: An Eagle Ford Case Study



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DAY 2
IGSEVENT.ORG

31 OCTOBER 2023, TUESDAY

ALL POSTER SESSIONS (CONCURRENT)

14:40 - 15:10

POSTER SESSION 5: DRILLING GEOMECHANICS

Session Chairs :

Osman Hamid

Yielded zone characterization while drilling a wellbore into clastic reservoirs using elastoplastic modeling approaches

Yousif M. B. Al-Asadi

3D Near-wellbore Geomechanical Modelling — Numerically Characterizing Borehole Stability

Mostafa Ahmed Mohamed Saleem

Enhancing Pressure Containment in Deepwater High-Pressure High-Temperature Drilling

STREAM 5

14:40 - 15:10

POSTER SESSION 6: STRUCTURE GEOMECHANICS

Session Chairs :

Muhammad Khan

Enhancing Fracture Characterization by Adopting Seismic and Geomechanical Restoration Approaches

Hui Wu

A low-dimensional parameterization method for discrete fracture networks based on Hough transform and autoencoder

Mohammed M. Al-Fahmi

Low fracture intensity in an anticline bisected by a mega strike-slip fault

STREAM 6



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AL KHOBAR, SAUDI ARABIA

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IGSEVENT.ORG

31 OCTOBER 2023, TUESDAY

SESSIONS 7, 8 & 9 (CONCURRENT)

15:10 - 16:50

SESSION 7: SUBSURFACE HYDROGEN AND ENERGY STORAGE

Session Chairs :

Matthias Brandt, Institut fuer Gebirgsmechanik

Energy storage in salt caverns with supercritical and transcritical CO₂

Pedro Vassalo Maia da Costa, Modecom

Large-scale of hydrogen underground storage in salt caverns: the future of sustainable energy storage

Julie Younes, University of Toronto

Effect of H₂ on Salt Caverns During Fast Cycling Injection-Production: Laboratory Characterization & Storage Integrity Workflow

Benoit Brouard, Brouard Consulting

Geomechanical evaluation of an offshore salt cavern for hydrogen storage

Christoph Lüdeling, IfG Institut für Gebirgsmechanik GmbH

Rock Salt Creep and Cavern Design

STREAM 1

15:10 - 16:50

SESSION 8: STRUCTURE GEOMECHANICS

Session Chairs :

Mark Cottrell, WSP-UK Ltd.

Enhancing and application of Terrestrial Based DFN Workflow to Planetary Sciences

Yaser Alzayer, Saudi Aramco

Evidence of Strain Partitioning and Strike-Slip Reactivation during Late Cretaceous Folding in Eastern Arabia

Xu Yang, Southwest Petroleum University

Quantitative Prediction of Tectonic Fractures in the Fourth Member of the Leikoupo Formation in the Pengzhou Area, Sichuan Basin

Jingshou Liu, China University of Geosciences

3-D heterogeneous geomechanics modeling and quantitative prediction of tectonic fractures in shale reservoirs

Jean Busson, TotalEnergies

Caprock fault Permeability change with reactivation: Experimental review of operational constraints

STREAM 2



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IGSEVENT.ORG

31 OCTOBER 2023, TUESDAY

SESSIONS 7, 8 & 9 (CONCURRENT)

15:10 - 16:50

SESSION 9: DRILLING GEOMECHANICS

Session Chairs :

Thomas Finkbeiner, King Abdullah University of Science and Technology (KAUST)

How geomechanics controls drillstring vibration induced wellbore damage

Osman Hamid, Saudi Aramco

Coupling Fluid Flow and Geomechanical Deformation Using AI & FEM Approaches

Tuhin Podder, Baker Hughes

Proactive Application of Drilling Geomechanics on Well Planning Resulted in Efficient Well Delivery in Algeria: Planning vs. Implementation

Adam Bere, Rockfield Global

Wellbore Completion Integrity Under Extreme Levels of Fault Loading

Yanhui Han, Saudi Aramco

SAGE-WSA and its applications in HPHT Formation

18:00 - 20:00

Gala Dinner, Sponsored by EXPEC ARC, Saudi Aramco

STREAM 3



INTERNATIONAL GEOMECHANICS SYMPOSIUM

30 OCTOBER–2 NOVEMBER 2023

AL KHOBAR, SAUDI ARABIA

DAY 3
IGSEVENT.ORG

1 NOVEMBER 2023, WEDNESDAY

SESSIONS 10, 11 & 12 (CONCURRENT)

7:30 - 8:30 **ONSITE REGISTRATION**
8:30 - 8:50 **OPENING SPEAKER**

8:50 - 10:10 **SESSION 10: MINING ROCK MECHANICS**

Session Chairs :

Jennifer Market, GeoActive

The Role of Geomechanics in the Modern Exploration and Production Lifecycle: Hydrocarbons, Mining, and the Energy Transition

Afifah Azmi, Petronas

Rare Earth Elements In-situ Leaching for Sustainable Energy Transition

Prafulla Chandra Tiwari, AKS University

Sustainable Mining of Rare Earth Elements in India - Challenges and Opportunities

Ben Powlay, University of Adelaide

Analysing "Real Time" Hydraulic Fracturing Effectiveness for increasing Caveability in Cave Mining using Monitoring techniques

10:10 - 10:20 **COFFEE BREAK - 10 MIN**

8:50 - 10:10 **SESSION 11: STRUCTURE GEOMECHANICS**

Session Chairs :

Oliver Rojas, Texas A&M University

Characterizing Fractures and Their Influence on the Development of a Low-Permeability Oil Field

Tuo Li, Heibei University of Technology

A numerical equivalence approach of discrete fracture network based on fracture connectivity

Chun Liu, PetroChina Hangzhou Research Institute of Geology

Effect of stress vertical zoning on reservoirs: An example from Kuqa foreland thrust belt, Tarim basin

Hany Khalil, Monash University

Unravelling the Geomechanical Dynamics of the Red Sea Rift: Insights from 3D Numerical Models

10:10 - 10:20 **COFFEE BREAK - 10 MIN**



INTERNATIONAL GEOMECHANICS SYMPOSIUM

30 OCTOBER–2 NOVEMBER 2023

AL KHOBAR, SAUDI ARABIA

DAY 3
IGSEVENT.ORG

1 NOVEMBER 2023, WEDNESDAY

SESSIONS 10, 11 & 12 (CONCURRENT)

8:50 - 10:10

SESSION 12: FUNDAMENTAL GEOMECHANICS

Session Chairs :

Dee Moronkeji, Apache

Present-day Stress Field of Western Desert of Egypt from Caliper and Image Logs

Youcef Bouchachi, Sonatrach

Present-day stress of Ahnet basin; a Dipole Shear Waves Anisotropy Approach

Abhijit Mitra, Premier Corex

Failure Characterization of Saturated Rock: Implication for Effective Stress Law

Gustavo Meurer, Petrobras

Lessons Learned in Salt Drilling Geomechanics at Brazilian Pre-salt in 20 years Experience

10:10 - 10:20

COFFEE BREAK - 10 MIN

STREAM 3



INTERNATIONAL GEOMECHANICS SYMPOSIUM

30 OCTOBER–2 NOVEMBER 2023

AL KHOBAR, SAUDI ARABIA

DAY 3
IGSEVENT.ORG

1 NOVEMBER 2023, WEDNESDAY

ALL POSTER SESSIONS (CONCURRENT)

10:20 - 10:50

POSTER SESSION 7: MACHINE LEARNING / AI

Session Chairs :

Lei Weng

Machine learning approach to predicting the macro mechanical properties of rock from the meso-structure parameters

Houdaifa Khalifa

A Machine Learning Framework for Quality Assurance and Prediction of well Path Deviations probabilistic

Zhenyu Tao

Carbonate formation pressure prediction method based on machine learning

STREAM 1

10:20 - 10:50

POSTER SESSION 9 : FUNDAMENTAL GEOMECHANICS

Session Chairs :

Abhijit Mitra

The Influence of Strain Rate on Rock Strength and Stiffness

Mohammad Hossein Khosravi

Experimental investigation of undercut stratified rocks using base friction technique

Xianzhi Song

Advance prediction method of ROP based on Di-S2S

STREAM 3

10:20 - 10:50

POSTER 8: CO2 SEQUESTRATION AND UTILIZATION

Session Chairs :

Yihuai Zhang

The mechanical response during the CO₂ storage in carbonate reservoir: an experimental study

Niccolò Menegoni

Fracture characterization of the Jizan Group from wellbore data and analog outcrop studies: implications for subsurface CO₂ basalt mineralization

Satya Perumalla

Balancing Surface Facilities & Well Design to comply with Cap-rock Integrity in CCS Projects: Experience from UAE

STREAM 2

10:20 - 10:50

POSTER 10: GEOMECHANICS FOR GEOTHERMAL & NEW ENERGIES

Session Chairs :

Demond Kauffman

Drilling Challenges and New Opportunities to Discover and Develop Geothermal Sector in the Middle East – Saudi Arabia: Jizan and Al Lith Area Case Studies

Elsa Maalouf

Subsurface Methane Migration through Degraded Cement and its Contribution to Climate Change

Elsa Maalouf

Experimental Investigation on the Influence of Operation and Formation Parameters on the Fracturing Fluid Flowback

STREAM 4



INTERNATIONAL GEOMECHANICS SYMPOSIUM

30 OCTOBER–2 NOVEMBER 2023

AL KHOBAR, SAUDI ARABIA

DAY 3
IGSEVENT.ORG

1 NOVEMBER 2023, WEDNESDAY

ALL POSTER SESSIONS (CONCURRENT)

10:20 - 10:50

POSTER SESSION 11: PETROLEUM GEOMECHANICS

Session Chairs :

Bing Yang

The effect of stylolites on the p-wave properties of parent carbonate rock

Eman Alabdulmuhsin

Impact of Geology on Geomechanical modelling applications in Carbonate Reservoirs

Michał Kępiński

Optimising Drilling Efficiency: Unveiling the Significance of Wellbore Ballooning in Challenging Geological Conditions

STREAM 5

10:20 - 10:50

POSTER SESSION 12: DRILLING GEOMECHANICS

Session Chairs :

TBC

Klemens Katterbauer

A deep learning approach to evaluate formation damage in CO₂ injection pressure transient analysis tests – a New Zealand aquifer analysis

M Rashad Amir Rashidi

CO₂ core-flood injectivity and ultrasonic P velocities acquisitions in Sarawak Carbonates

STREAM 6



INTERNATIONAL GEOMECHANICS SYMPOSIUM

30 OCTOBER–2 NOVEMBER 2023

AL KHOBAR, SAUDI ARABIA

DAY 3
IGSEVENT.ORG

1 NOVEMBER 2023, WEDNESDAY

SESSIONS 13, 14 & 15 (CONCURRENT)

10:50 - 12:10

SESSION 13: MINING ROCK MECHANICS

Session Chairs:

STREAM 1

Mohammed Hefni, King Abdulaziz University

Reinforcing cemented paste backfill with basalt fiber: A path towards sustainable practice in mine backfilling

Yolan Govindarajulu, University of Johannesburg

A Possible Future of Rock Engineering: A subjective visualisation and critique of a rock engineer's function within a futuristic mining environment

Ruilin Yang, Orica Limited

Integral system of monitoring and modeling for blast optimization

Xin Liu, University of Science and Technology Liaoning

Energy based model with non-symmetrical branch fractures of different roughness

12:10 - 13:10

LUNCH - 1 HR

10:50 - 12:10

SESSION 14: CO2 SEQUESTRATION & UTILIZATION

Session Chairs:

STREAM 2

Mustafa Sari, CSIRO Energy

Implication of CO2 injection into calcite-cemented siliciclastic reservoir: Experimental observation during NMR-FBG core flooding assembly

Jijun Miao, SimTech LLC

Realtime CO2 Plume Monitoring and Optimization System through Coupling with Reservoir and Geophysical Calibration

Dan Roberts, Rockfield Global

Accounting for Stress History and Lithology in Geomechanical Models: Implications for Subsurface CO2 Storage Integrity on the Horda Platform

Haizhu Wang, China University of Petroleum

Modelling and Verification of Transient Flow and Heat Transfer for CO2 Injection Wells — Application to CCUS Project at H3 Block, China

12:10 - 13:10

LUNCH - 1 HR



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30 OCTOBER–2 NOVEMBER 2023

AL KHOBAR, SAUDI ARABIA

DAY 3
IGSEVENT.ORG

1 NOVEMBER 2023, WEDNESDAY

SESSIONS 13, 14 & 15 (CONCURRENT)

10:50 - 12:10

SESSION 15: GEOMECHANICS FOR UNCONVENTIONAL

Session Chairs :

Francis Elisabeth, Saudi Aramco

State of the Art of Conventional vs. Unconventional Geomechanics Characterization

Mohammed Ba Geri, NewPark Drilling Fluids

Novel Fresh Water-Based Mud System in Highly Reactive Shale Formation:
Experimental and Case Studies

Eric van Oort, The University of Texas at Austin

A New Confined Swelling Test for Improved Fluid-Shale Compatibility Evaluation

GRINI Charaf Eddine, ENAGEO/SONATRACH

Borehole Stability Analysis For Frasnien Hot Shale Using 3D Seismic Geomechanical
Modelling In One Of The Algerian Petroleum Field

12:10 - 13:10

LUNCH - 1 HR

SESSIONS 16, 17 & 18 (CONCURRENT)

13:10 - 14:50

SESSION 16: MINING ROCK MECHANICS

Session Chairs :

Abdelsalam N.A. Abugharara, Memorial University of Newfoundland

Evaluation of Mining Ore Bodies Through Laboratory Core Characterization for Full-face
Mining Recovery Optimization

Mohammed Sazid, King Abdulaziz University

Simulation of old surface and underground working for assessment of slope stability

Yuedu Chen, Taiyuan University of Technology

Shear softening to hardening behaviors of coal structural plane after supercritical CO₂
soaking: experiment and theoretical models

Wang Chenghu, National Institute of Natural Hazards, MEMC

Utilizing high-precision detecting methodology for comprehensive determination of stress
fields for tunnelling engineering of Sichuan-Tibet Railway Project

Wagdi Mohammed Hamid, King Saud University

Utilization of Mine Tailings Based Geopolymer to Enhance the Bearing Capacity of Sabkha
Soil

14:50 - 15:00

COFFEE BREAK - 10 MIN

STREAM 3

STREAM 1



INTERNATIONAL GEOMECHANICS SYMPOSIUM

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1 NOVEMBER 2023, WEDNESDAY

SESSIONS 16, 17 & 18 (CONCURRENT)

13:10 - 14:50

SESSION 17: CO₂ SEQUESTRATION & UTILIZATION

Session Chairs :

Zhao Feng, Tongji University

A deep-learning-based surrogate model for simulating coupled hydro-mechanical processes during geological CO₂ sequestration

Kanitthorn Adisornsupawat, PTTEP

An assessment of wellbore integrity during the planned injection of CO₂ within a depleted reservoir through numerical analyses

M Rashad Amir Rashidi, Petronas Research Sdn Bhd

Mechanical Properties Degradation in Depleted Clastic Reservoirs for CO₂ Storage

Ali Mortazavi, Nazarbayev University

Investigation of Faults Activation Mechanisms in Carbon (CO₂) Storage

Siti Syareena M Ali, Petronas Research Sdn Bhd

Evaluating Highly Porous and Depleted Carbonate Field for CO₂ Storage Site Using A Novel Approach of Integrated Coupled Geomechanics-dynamic Modelling

14:50 - 15:00

COFFEE BREAK - 10 MIN

13:10 - 14:50

SESSION 18: HYDRAULIC FRACTURING

Session Chairs :

Mark McClure, ResFrac Corporation

Effective Moduli Approximations to Capture the Effect of Anisotropy on Multistage Hydraulic Fracturing in Shale

TBC

Liu Chun, Nanjing University

The hydraulic fracturing simulation based on MatDEM

Peter Bautmans, Equinor ASA

Insights from Equinor's Extended Leak-Off Test database

Xianghui Qin, Chinese Academy of Geological Sciences

A novel method to obtain the shut-in pressure in the hydraulic fracturing test

14:50 - 15:00

COFFEE BREAK - 10 MIN

STREAM 2

STREAM 3



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1 NOVEMBER 2023, WEDNESDAY

ALL POSTER SESSIONS (CONCURRENT)

15:00 - 15:50

POSTER SESSION 13: MACHINE LEARNING / AI

Session Chairs:

Hamzah Al-Sharifi

Evaluation of different tree-based machine learning approaches for formation lithology classification

Osama Mutrif Siddig

Integrating Drilling Data And Machine Learning For Improved Rock Mechanics Prediction

Wei Yu

Optimizing Refracturing Models in Tight Oil Reservoirs: An Integrated Workflow of Geology and Geomechanics Leveraging Artificial Intelligence

Ashraf Ahmed

White Box Artificial Neural Network Model for Real-Time Bulk Density Forecast

Zhongyu Hu

Fracture morphology evaluation of surrogate model for fast prediction using machine learning

17:30 - 21:00

CULTURAL VISIT

15:00 - 15:50

POSTER 14: FUNDAMENTAL GEOMECHANICS

Session Chairs:

Deheng Kong

Multiscale rock discontinuity roughness characterization using smartphone photogrammetry

Jianming Chen

Application and Estimation of Crack Density via Experimental Velocity Data

Dejian Li

Study on time-varying characteristics and prediction of acoustic emission of granite strainburst with initial temperature damage

Abubakar Isah

Effect of Geomechanical Properties on Rock Wetting Behavior

Bowen Zheng

Study on the anisotropy of shear fracture surface morphology for reservoir shale

17:30 - 21:00

CULTURAL VISIT



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IGSEVENT.ORG

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ALL POSTER SESSIONS (CONCURRENT)

15:00 - 15:50

POSTER 15: HYDRAULIC FRACTURING

Session Chairs:

Kaiming Xia

Selecting Hydraulic Fracturing Method for Wells Landed in Deep and Tight Gas Reservoirs

Zhongyu Hu

Geomechanics analysis for high breakdown pressure of deep tight sandstone formation: A case study

Jianbin Li

Study on the mechanism of hydraulic fracture propagation in two sets of fracturecavity carbonate reservoirs

Su Wang

Experimental study on indoor multi-cluster fracturing based on distributed fibre-optical monitoring

Mao Sheng

Optimization of perforation parameters for shale gas horizontal wells in Weiyuan block, Sichuan Basin- A case study of well X1

17:30 - 21:00

CULTURAL VISIT

15:00 - 15:50

POSTER 16: CO2 SEQUESTRATION & UTILIZATION

Session Chairs:

Andika Perbawa

Monitoring Ultrasonic Velocity of Late Jurassic Carbonate Rocks Saturated by Brine and Supercritical CO2 using Coda Wave Analysis

Kristine Halvorsen

Fluid flow in gouge-filled sandstone fractures – An experimental study to investigate hydraulic conductivity in relation to fault gouge ratio

Youheng Zhang

Numerical Simulation on Interaction between the Supercritical CO2 and Water-Rock in Tarim Basin

Masashi Kodama

Joint inversion of muography and seismic wave exploration

Yafan Yang

Molecular Perspectives of Fluid-Solid Interfacial Tensions in Water+Gas+Solid Systems under Geological Conditions

17:30 - 21:00

CULTURAL VISIT



INTERNATIONAL GEOMECHANICS SYMPOSIUM

30 OCTOBER–2 NOVEMBER 2023

AL KHOBAR, SAUDI ARABIA

DAY 3
IGSEVENT.ORG

1 NOVEMBER 2023, WEDNESDAY

ALL POSTER SESSIONS (CONCURRENT)

15:00 - 15:50

POSTER SESSION 17: PETROLEUM GEOMECHANICS

Session Chairs:

Francis Elisabeth

Regional rock mechanics characterization of a tight sandstone with destructive/non-destructive measurements and artificial intelligence.

Ahmed Alharthi

A Cost-Effective Approach for Obtaining Geomechanics Data using Micro Rebound Hammer Test (MRT)

Sameeh I Batarseh

First Successful High Power Laser Descaling and Its Effect on Wellbore Stability

Zainab Al Ibrahim

Automatic Core to Log Depth Adjustment for Geomechanical Parameters Calibration

Wael El Sherbeny

Consequences Of Formation Petrophysical Characteristics on Both Wellbore Strengthening and Wellbore Stability: A Case Study, East Nile Delta, Egypt

18:00 - 20:00

Dinner at Ithra, Sponsored by Gas Development Department, Saudi Aramco

15:00 - 15:50

POSTER SESSION 18: DRILLING GEOMECHANICS

Session Chairs:

Ashok Shinde

Gaining the Trust of Drillers using Expert System powered by Geomechanics

Nanthakumar Rajaiah

Assessing failure criteria in carbonate reservoirs through geomechanics modeling of underbalance drilling

Osman Hamid

Solid Production Prediction in Weak Sandstone Formation Using Finite Element Modeling (FEM) Approaches

Ahmed Ali Alrashed

Modelling the Laser Penetration in Cased Hole Completions: Thermal & Mechanical Effects

Tianshou Ma

Physics-constrained distributed neural network model for 3D in-situ stress prediction

18:00 - 20:00

Dinner at Ithra, Sponsored by Gas Development Department, Saudi Aramco



INTERNATIONAL GEOMECHANICS SYMPOSIUM

30 OCTOBER–2 NOVEMBER 2023

AL KHOBAR, SAUDI ARABIA

DAY 4
IGSEVENT.ORG

2 NOVEMBER 2023, THURSDAY

SESSIONS 19, 20 & 21 (CONCURRENT)

7:30 - 8:30 **ONSITE REGISTRATION**
8:30 - 8:50 **OPENING SPEAKER**

8:50 - 10:10 **SESSION 19: SUBSURFACE HYDROGEN AND ENERGY STORAGE**

Session Chairs :

Klemens Katterbauer, Saudi Aramco

Distributed local sensor data optimization for hydrogen storage optimization utilizing a deep learning approach – a Taranaki basin investigation

Anke Simone Wendt, SLB

The Role of Integrated Geomechanics in the Energy Transition—Contributing to a Safer and Cleaner Environment

TBC

Kan Wu, Texas A&M University

Completion Design Evaluation based on Data Analysis of Distributed Fiber Optic Sensing

10:10 - 10:20 **COFFEE BREAK - 10 MIN**

8:50 - 10:10 **SESSION 20: CO2 SEQUESTRATION & UTILIZATION**

Session Chairs :

Julian Guerra, SLB

Derisking site selection for CO2 injection in UAE through geomechanics forward modeling

Juan Chavez, AXIS

Developing Comprehensive Models of Completion and Formation Integrity During CO2 Injection into Depleted Reservoirs

Taher Sodager, Saudi Aramco

Feasibility of Time-lapse seismic methods for monitoring CO2 storage in the Devonian Carbonate Reef

Talal Al Shafloot, KFUPM

Experimental Evaluation of Frictional and Hydraulic Behavior of sc-CO2-saturated Fractures During Controlled Rate Slippage

10:10 - 10:20 **COFFEE BREAK - 10 MIN**

STREAM 1

STREAM 2



INTERNATIONAL GEOMECHANICS SYMPOSIUM

30 OCTOBER–2 NOVEMBER 2023

AL KHOBAR, SAUDI ARABIA

DAY 4
IGSEVENT.ORG

2 NOVEMBER 2023, THURSDAY

SESSIONS 19, 20 & 21 (CONCURRENT)

8:50 - 10:10

SESSION 21: HYDRAULIC FRACTURING

Session Chairs :

Adam Donald, SLB

Anisotropic Elastic Constants for Stimulation Design using a novel machine learning aided inversion accounting for borehole fluid velocity

Aflah Al Yaaribi, Petroleum Development Oman (PDO)

Optimization of Hydraulic Stimulation Treatments of Tight Sandstone Gas Reservoirs in Oman with Geomechanical Sensitivity Analysis Using Analytical Simulation Techniques; A Case Study

Peng Yang, China University of Petroleum

Multi-well Pad Hydraulic Fracturing Modeling for Coupling 3D Fracture Propagation and Proppant Migration

Joseph Leines, SimTech LLC

Dynamic 3D Hydraulic Fracture Propagation Considering the Influence of Horizontal Bedding Planes and Natural Fractures in Unconventional Reservoirs

10:10 - 10:20

COFFEE BREAK - 10 MIN

STREAM 3



INTERNATIONAL GEOMECHANICS SYMPOSIUM

30 OCTOBER–2 NOVEMBER 2023

AL KHOBAR, SAUDI ARABIA

DAY 4
IGSEVENT.ORG

2 NOVEMBER 2023, THURSDAY

ALL POSTER SESSIONS (CONCURRENT)

10:20 - 10:50

POSTER SESSION 19: STRUCTURE GEOMECHANICS

Session Chairs :

Gull Fatima

Paleostress Inversion and Numerical modelling of fracture pattern along western limb of Hazara

Haiyan Zhu

A FEM-DFN model for the interaction and propagation of multi-cluster fractures during variable fluid-viscosity injection in layered shale oil reservoir

Zhao Zexi

Application of time-varying frequency-divisional deconvolution to reservoir prediction in complex fault block areas

STREAM 1

10:20 - 10:50

POSTER 21: DRILLING GEOMECHANICS

Session Chairs :

Hong Yan

From Analytical to Applicable: An Analytical Solution for Linear Elastic Geomechanical Responses in Layered VTI Medium

Wei Li

Lithology Identification using Drill Bit Sounds

Rached Rached

Numerical Tool for Multilateral Well Stability Analysis: FEM-Based Approach

STREAM 3

10:20 - 10:50

POSTER 20: FUNDAMENTAL GEOMECHANICS

Session Chairs :

Michał Kępiński

Ductile behavior of anhydrites during multistage failure triaxial tests

Yiwei Chen

Finite element analysis of ultrasonic P-wave velocity in carbonates with water-bearing pores

Mohammed Farfour

A new Quick Look Interpretation: Theory and Application

STREAM 2

10:20 - 10:50

POSTER 22: MINING ROCK MECHANICS

Session Chairs :

Ben Powlay

The Application of Hydraulic Fracturing in Hard Rock Caving to Promote Caveability

GUO Yong-cheng

The analysis of unloading zone and rock quality evaluation in the Maya slope

Jili Feng

Investigation on prediction of mechanics parameters of engineering disturbed rock mass using resistivity exploration

STREAM 4



INTERNATIONAL GEOMECHANICS SYMPOSIUM

30 OCTOBER–2 NOVEMBER 2023

AL KHOBAR, SAUDI ARABIA

DAY 4
IGSEVENT.ORG

2 NOVEMBER 2023, THURSDAY

ALL POSTER SESSIONS (CONCURRENT)

10:20 - 10:50

POSTER SESSION 23: HYDRAULIC FRACTURING

Session Chairs :

Tameem Almani

Predicting Formation Breakdown Pressures for Arbitrary Wellbore Orientation Using Machine Learning Techniques

Ahmed Ali Alrashed

Sensitivity of Stress Distribution to the Change in Rock's Geomechanical Properties During Laser Heating

Sergey Stanchits

Parameters of granite Hydraulic Fracturing induced by waterless fluid injections

STREAM 5

10:20 - 10:50

POSTER SESSION 24 : SUBSURFACE HYDROGEN AND ENERGY STORAGE

Session Chairs :

Osman Hamid

The Role of Geomechanics on Hydrogen Extraction

Ahmed Alsaffar

Impurity Measurement for Sustainable Hydrogen Fuel Utilizing Analytical Methods Based on ISO 21087:2019

Klemens Katterbauer

Enhancing recovery from natural hydrogen reservoirs – an AI-driven Logging while drilling optimization methodology

STREAM 6



INTERNATIONAL GEOMECHANICS SYMPOSIUM

30 OCTOBER–2 NOVEMBER 2023

AL KHOBAR, SAUDI ARABIA

DAY 4
IGSEVENT.ORG

2 NOVEMBER 2023, THURSDAY

SESSIONS 22, 23 & 24 (CONCURRENT)

10:50 - 12:10

SESSION 22: GEOMECHANICS FOR GEOTHERMAL & NEW ENERGIES

Session Chairs:

Wael El Sherbeny, Baker Hughes

Understandings of captured lessons-learned enhances learning curve of geothermal development and production, methodology & global Case Histories

Marc Hettema, EBN

Maximum Earthquake Moment Magnitude Induced by Gas Depletion and Geothermal Injection: Similarities and Differences.

Yingchun Li, Dalian University of Technology

Hydraulic fracturing for excavation-enhanced geothermal system (E-EGS): Review, opportunities and challenges

Chun'an Tang, Dalian University of Technology

Extraction-enhanced geothermal system: Strategic transformation from mineral mining to heat mining

12:10 - 13:10

LUNCH - 1 HR

10:50 - 12:10

SESSION 23: CO2 SEQUESTRATION & UTILIZATION

Session Chairs:

Karsten Fischer, SLB

Defining the impact of far-field stress uncertainty on the confidence of fault criticality analyses from 3D geomechanical simulations for CCS project

Kun SU, TotalEnergies

Prediction of hydraulic and thermal induced fracture due to CO2 injection using equivalent inclusion method

Jun Matsushima, The University of Tokyo

Estimation of CO2 saturation and geomechanical parameters by combination of cosmic-ray muons and seismic exploration: Laboratory scale experiment

Vlasios Leontidis, IFP Energies nouvelles

Sensitivity of impurities to CO2 flow in injection wells

12:10 - 13:10

LUNCH - 1 HR

STREAM 2



INTERNATIONAL GEOMECHANICS SYMPOSIUM

30 OCTOBER–2 NOVEMBER 2023

AL KHOBAR, SAUDI ARABIA

DAY 4
IGSEVENT.ORG

2 NOVEMBER 2023, THURSDAY

SESSIONS 22, 23 & 24 (CONCURRENT)

10:50 - 12:10

SESSION 24: HYDRAULIC FRACTURING

Session Chairs :

Johannes Vossen, Baker Hughes

Geomechanical Analyses of Hydraulic Fracturing Efficiency and Challenges in a Tight Clastic Reservoir: Experiences over Years

Mohammed Hamed Salim AL-Aamri, Petroleum Development Oman (PDO)

Mineralogical based Geomechanical model assisted hydraulic Fracture design for Fiber Optics well: Tested in a tight gas Sandstone reservoir

Haiyan Zhu, Chengdu University of Technology

A new technology of combined network fracturing for shale oil reservoir in Jiyang Depression

Ali Shawaf, University of Wyoming

The Impact of Formation Anisotropy and Stresses on Fracture Geometry – A Case Study in Jafurah's Tuwaiq Mountain Formation (TMF), Saudi Arabia

12:10 - 13:10

LUNCH - 1 HR

SESSIONS 25, 26 & 27 (CONCURRENT)

13:10 - 14:50

SESSION 25: INTEGRATED CASE STUDIES

Session Chair: Tariq Mahmood

Fei Wang, Xi'an Shiyou University

The technology of development regime transformation in super-low permeability oil reservoir to significantly improve recovery efficiency: case study in HQ oilfield, Ordos Basin, China

Michał Kępiński, PGNiG

Stress profiling within fault-and-thrust-belt considering a structural strain: the case of a deep borehole in the Outer Carpathians (Poland)

Souvik Sen, Baker Hughes

Characterization of Maximum Horizontal Stress from wellbore failures – A case study from the tight Paleozoic Hamra Quartzite oil reservoir of Qued Mya Basin, Algeria

Ersi Xu, PetroChina Southwest Oil & Gas Field Company

A Comprehensive Evaluation of Diagnostic Fracture Injection Testing for Shale Gas Horizontal Wells in Southern Sichuan Basin, China

Ruqaya Al Zadjali, PDO

Geomechanical Integration Maximizes the Value for polymer full field decision for Clastic Reservoir field in South of Oman

14:50 - 15:00

COFFEE BREAK - 10 MIN



INTERNATIONAL GEOMECHANICS SYMPOSIUM

30 OCTOBER–2 NOVEMBER 2023

AL KHOBAR, SAUDI ARABIA

DAY 4
IGSEVENT.ORG

2 NOVEMBER 2023, THURSDAY

SESSIONS 25, 26 & 27 (CONCURRENT)

13:10 - 14:50

SESSION 26: CO2 SEQUESTRATION & UTILIZATION

Session Chairs :

Enyi YU, Peking University

In-situ stress simulation and analysis during CO2 geological storage

Zhigulskiy S. Gazpromneft Science and Technology Centre

Two-way coupling simulation and geomechanical modelling of fault activation related to Carbon Capture and Storage

Takumi Onuma, University of Tokyo

A Consideration on Key Reservoir Parameter for Surface Displacement at CCS/CCUS Sites

Sahriza Salwani Md Shah, PETRONAS Research Sdn Bhd

Impact of CO2 and H2S exposure on tensile strength of carbonate rock for CO2 storage evaluation

Muhammad Hamzi Yakup, PETRONAS

CO2 Thermal Behaviour and Associated Geomechanics Risks Evaluations for the First Malaysian Offshore CCS Project Utilizing Full Field And Near Wellbore Thermal Modelling Approaches

14:50 - 15:00

COFFEE BREAK - 10 MIN

13:10 - 14:50

SESSION 27: HYDRAULIC FRACKING

Session Chairs :

Xuanhe Tang, Chengdu University of Technology

Complex well-interferences during multi-wells hydraulic fracturing in Weirong deep shale gas reservoir

Bo Zheng, Chinese Academy of Sciences

Investigation on the geomechanical parameters distribution and the hydraulic fracturing processes of the Lucaogou shale oil reservoirs

Haoyong Huang, PetroChina Southwest Oil & Gas Field Company

A Geomechanics Model-Driven solutions On Frac Hits And Casing Deformation In Ultradeep Shale Hydraulic Fracturing

Tao You, Hohai University

On poroelastic strain energy degradation in the variational phase-field models for hydraulic fracture in oil or gas shale

Jian Zhu, China University of Petroleum

Experimental Investigation of Oil Displacement Caused by Fracturing-Fluid Imbibition in Hydraulically Fractured Oil-Wet Shale Reservoirs

14:50 - 15:00

COFFEE BREAK - 10 MIN



INTERNATIONAL GEOMECHANICS SYMPOSIUM

30 OCTOBER–2 NOVEMBER 2023

AL KHOBAR, SAUDI ARABIA

DAY 4
IGSEVENT.ORG

2 NOVEMBER 2023, THURSDAY

ALL POSTER SESSIONS (CONCURRENT)

15:00 - 15:50

POSTER SESSION 25: STRUCTURE GEOMECHANICS

Session Chairs:

Phyllis Shin-Yu Wu

3D visualization of a complex fracture network formed by true-triaxial testing

Lejia Ren

Experiments and analysis on different mineral fabric shale fracturing by a CT visualized multi-functional experimental equipment

TBC

Songfeng Guo

Stress Disturbance around Xianshuihe Fault Zone and Implication for Fault Stability and Tectonic Dynamics

Kareem Ramzy Aboayannah

Investigating Thermal Gradient Cracking and Fracture Process Zone Development in Granitic Rocks

15:50 - 16:10

SYMPOSIUM CLOSING - 20 MIN

STREAM 1

15:00 - 15:50

POSTER 26: GEOMECHANICS FOR UNCONVENTIONAL

Session Chairs:

Ahmed Merzoug

Modelling Horseshoe Wells Performance in Unconventional Plays

LI Yuqi

Model of Fractured Horizontal Wells in Shale Oil Reservoirs with Bedding Fractures Considered

Eduardo Gramajo Silva

Characterization and Index Measurements of the Unconventional Qusaiba Rock Member from Qassim Region, Saudi Arabia

Guangfu Zhang

Study on Temperature Field during Drilling and Temperature Reduction by Mud Density Reduction Technology in Deep Shale Gas Well

TBC

15:50 - 16:10

SYMPOSIUM CLOSING - 20 MIN

STREAM 2



INTERNATIONAL GEOMECHANICS SYMPOSIUM

30 OCTOBER–2 NOVEMBER 2023

AL KHOBAR, SAUDI ARABIA

DAY 4
IGSEVENT.ORG

2 NOVEMBER 2023, THURSDAY

ALL POSTER SESSIONS (CONCURRENT)

15:00 - 15:50

POSTER 27: PETROLEUM GEOMECHANICS

Session Chairs:

Reynaldi Mikhael Chrislianto

Sand Production Prediction for an Offshore Well with a Shallow Unconsolidated Reservoir Zone, Mako Gas Field, Natuna Sea, Indonesia

Deng Fucheng

Study on Sand Production Mechanism of Fractured Reservoir in Dina Gas Field

Abinash Bal

Transition from Poroelastic to Fluid Dynamic Effect: Understanding Fluid Flow Behaviour in Depleted Shale Gas Reservoirs

Elyar Kavosian

Analysis of time dependent of a problematic zone in an oil well

Hemant Singh

Deepwater Field Development Decision- You Must Consider Geomechanical Risks

15:50 - 16:10

SYMPOSIUM CLOSING - 20 MIN

15:00 - 15:50

POSTER 28: INTEGRATED CASE STUDIES

Session Chairs:

Prajit Chakrabarti

Integration of 1-D geomechanical model for Minimum Horizontal Stress Estimation and validation with micro-frac tests - cases study from Touggourt field, Algeria

TBC

TBC

Mousa Almousa

Groundwater Management Strategies for Handling Produced Water Generated Prior Injection Operations in the Bakken Oilfield.

Isauro Abinadi Valdez Cruz

Digital Enablement of Dynamic Risk Management to Drive Operational Efficiency through a Real-Time International Operations Integrity Center

15:50 - 16:10

SYMPOSIUM CLOSING - 20 MIN

STREAM 3

STREAM 4



INTERNATIONAL GEOMECHANICS SYMPOSIUM

30 OCTOBER–2 NOVEMBER 2023

AL KHOBAR, SAUDI ARABIA

DAY 4
IGSEVENT.ORG

2 NOVEMBER 2023, THURSDAY

ALL POSTER SESSIONS (CONCURRENT)

15:00 - 15:50

POSTER SESSION 29: HYDRAULIC FRACKING

Session Chairs:

Tameem Almani

Sensitivity Analysis of the Factors Affecting Formation Breakdown Pressure Using a Computational-Based Approach

Ruud Weijermars

Fracture Propagation-Rate and Fracture Half-Length Estimation for Individual Fracturing Stage through Dynamic Balancing of Fluid Pressures: Eagle Ford Case Study

Ruud Weijermars

Technical Thresholds for Hydraulic Fracturing in Tight Formations

Yazeed Altowairqi

The integration of microseismic applications with advanced seismic interpretation tools: a new workflow for frack design optimization and sweet spotting

Nawaf Abdulrahman A Alghamdi

A Hybrid Approach for Fracability Evaluation

15:50 - 16:10

SYMPOSIUM CLOSING- 20 MIN

15:00 - 15:50

POSTER SESSION 30: INTEGRATED STUDIES

Session Chairs:

Ahmed S. Alhawaj

Unravelling reservoir characteristics through integrative geomechanical approaches

Abdullah Alghamdi

Modelling the effect of seismic scale faults on intra-formational strain within reservoir rocks

Abbas Khaksar

Validation of Geomechanical Sanding Predictions with Subsequent Production and Water Injection in a Rejuvenated Oil Field, Offshore Malaysia

Rahul Talreja

Anisotropic Aided Drilling & Completion Optimization for the Structurally Complex Bengal Onland Basin, India

Mohamed Mergany

A novel AI technique to decipher subsurface fault complexity, method to reveal concealed faults

15:50 - 16:10

SYMPOSIUM CLOSING - 20 MIN