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Franz O Meyer, J Ind Environ Chem, Volume:3
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Franz O Meyer

MwSol Corp., USA

Fueling the future - A quest with electromagnetic radiation

Fossil fuel is the life blood of our civilization. It enables cogs to turn, wheels to roll and effects every aspect of our lives. It even makes earth's climate more liveable by powering technology that moderates temperature extremes. Alex Epstein eloquently shows that fossil fuels benefit rather than harm humanity. As such, it is our moral responsibility to unlock the known 6.4 trillion barrels of unconventional heavy oil and bitumen deposits. Fulfilling our moral responsibility faces the headwinds of Intense environmental and political opposition. Emerging electromagnetic (EM) technology silences rational environmental protest but not the irrational political echo chamber support for unsustainable green energy. EM is a clean technology. It requires no solvents, no external water, emits no CO2, and has a small environmental footprint. Present commercial thermal EOR applications limit themselves to the low frequency (10 Hz to 700 kHz) end of the radio frequency portion of the electromagnetic spectrum. Long wavelength radio frequency emission produces a large EM field but injects heat slowly. Within the EM field, polar in situ formation water molecules vibrate and create frictional heat that ultimately produces a steam chamber. Reservoir temperature increase is a function of the water molecule vibration rate. RF technology presently uses EM frequencies that reduce vibration cycles between 10 to 700 thousand times per second. Low water vibration rate is the main limitation of current RF heat injection because the frictional heat build-up takes years to reduce oil viscosity sufficient for efficient production. Microwave technology is more effective, because it vibrates water molecules at 2 to 3 billion times per second and produces higher frictional heat. However, the EM field is much smaller than the present commercial RF technology. Expanding the reach of the Microwave heat injection involves the thermal runaway principle and pulsed radiation transmission. Reservoir heat build-up is intense with a patent pending monopole microwave antennae. Pulsing microwave transmission dramatically improves production economics of heavy oil and bitumen. This new technology can open-up currently immobile reserves and can help fuel the world's energy needs for decades to come.

Speaker Biography

Franz O Meyer is an accomplished Senior Executive and Entrepreneur with demonstrated success spanning oil and geology. He serves as CEO of MwSol. corp., a startup whose mission is developing clean and innovative technologies. Dr. Meyer received his bachelor's degree in Geology from SUNY at New Paltz, and his master's and PhD degrees in geology from the University of Michigan where he specialized in invertebrate palaeontology under the supervision of Dr. Bruce Wilkinson. Franz O. Meyer is a pioneer in the interpretation and use of Gamma-ray logs and their application in carbonate deposits for sequence stratigraphy. He was a regular consultant for companies such as Aramco and ADCO. His recent research activities include electromagnetic radiation to heat oil reservoirs and dolomite stratigraphy. His work has been featured in Science, SEPM, and Geo Arabia.

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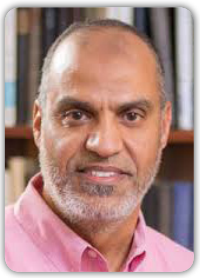

Mansur Ermila

Colorado School of Mines, USA

Utilizing well logs and experimental core data to assess hydrocarbon potential of a mature oilfield

Estimating petrophysical parameters from well logs plays a significant role in exploring and developing oil and gas reservoirs. This study presents results of log analysis from four wells in a mature oil field in Sirte basin, Libya. A complete statistical analysis is proposed to obtain average petrophysical properties such as porosity, permeability and hydrocarbon/water saturations at the well location. This analysis is based on wireline logs data then verified with experimental core plugs in order to minimize uncertainty. Based on the characteristics of oilfield lithology, the rock mainly consists of sand and shale sequences. The computed results from well logs were generally in good agreement with the experimental core plugs from the same wells. Computed petrophysical parameters for the wells gave an average total porosity ranging from 16% to 26% and permeability in the range of 20 mD to 3358 mD. Water and hydrocarbon saturation were found at an average range of 28% to 57%, and 43% to 72%, respectively. The overall results indicate that the oil-bearing zones in the studied wells are highly permeable and porous and the field still has a vast commercial hydrocarbon potential that can be economically depleted.

Speaker Biography

Mansur Ermila joined the Petroleum Engineering Department in 2012 as a Research Assistant professor and became a full-time member of the faculty in 2015. He teaches Drilling engineering, well completion, reservoir fluid properties, reservoir rock properties, introduction to petroleum industry and advanced drilling fluid. He earned his B.S. from University of Tripoli in Petroleum Engineering, and a M.S. in petroleum engineering from University of Miskolc (Hungary) and PhD in petroleum engineering from Colorado School of Mines. His research interests include drilling operation, well completion, stimulation, artificial lift optimization. He is an active member of SPE, AADE, ARMA and Pi Epsilon Tau.

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Sayyad Zahid Qamar

Sultan Qaboos University, Sultanate of Oman

Integrity assessment of polymer pipes in petroleum drilling applications

In oil wells where viscosity of the crude is very high (heavy oil), steam is injected to increase the fluidity and mobility of the oil. This steam injection requires large quantities of water, generally transported from nearby fields. In some oilfields in the Gulf region, and around the world, the water-bearing sandstone is highly fragmented. Sand screens made of carbon-steel do not provide reliable sand control, as they quickly undergo quite serious corrosion. Some oilfields have started to try out non-metallic materials (such as strengthened polymers) because of their non-corroding nature. Based on a hit-and-trial approach, around 15% wells have reported failure due to screen collapse. In collaboration with a regional petroleum development company, an experimental testing facility was designed and developed at Sultan Qaboos University for integrity assessment of large-diameter hard polymeric pipes. This included design and construction of the test setup and jigs and fixtures, together with a compatible testing scheme. Following procedures set forth by international standards, polymer pipes had to go through a 2-3-month ageing process before mechanical testing, in brine solution matching the salinity of the water field. For testing under compressive loads, a fixture was developed for the pipes to be tested on a heavy-duty universal testing machine, using several sets of strain gages to record dynamic behavior in axial and hoop directions. A full-scale test facility was designed and constructed to determine collapse strengths of polymer pipes of around 6-m length, using steel pipes of 16-in diameter as outer casings. Apart from the scientific contribution, findings from this work can serve as prequalification of polymer pipes for appropriate fields, and result in major savings in cost and time.

Speaker Biography

Sayyad Zahid Qamar is currently associated with the Mechanical and Industrial Engineering Department, Sultan Qaboos University (SQU), Muscat, Oman. He has over 25 years of academic and research experience in different international universities. He has also worked as a professional mechanical engineer in the field for over 6 years in the heavy engineering and fabrication industry. He has also been actively involved in research and accreditation work related to engineering education. His research areas are Applied materials and manufacturing, Applied mechanics and design, Reliability engineering and Engineering education. As part of the Applied Mechanics and Advanced Materials Research group (AM2R) at SQU, he has been involved in different applied research funded projects in excess of 4 million dollars. He has over 200 research/technical publications to his credit (2 research monographs/books, 2 edited book volumes, 6 book chapters, 160 publications in refereed international journals and conferences, and 36 technical reports). He is currently editing one volume (Renewability of Synthetic Materials) for the Elsevier Encyclopaedia of Renewable and Sustainable Materials. He has served as Associate editor, Guest editor, and Member editorial board for different research journals (including Materials and Manufacturing Processes, Journal of Elastomers and Plastics, The Journal of Engineering Research, etc).

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Avraam Zelilidis

University of Patras, Greece

Late cretaceous to early Eocene geological history of the eastern Ionian Basin, southwestern Greece: A sedimentological approach

Sedimentological studies of the Upper Cretaceous–Lower Eocene limestones in the western part of the Ionian basin (Araxos area) indicate that these sediments are composed of calciturbidites interbedded with breccia-microbreccia. Breccia - microbreccia deposits are structureless, display channelized geometry with calciturbiditic blocks internally to the channels. Most of the clasts were sourced from the underlying Lower Cretaceous "Vigla limestones". Calciturbidites include Ta to Te Bouma sub-divisions and are organized in cycles that form channelized deposits with a high degree of amalgamation. Statistical analysis confirms the presence of order in the sub-division sequence. The thickness of the calciturbidite event beds of the section is also well characterized by a lognormal statistical distribution, possibly produced by multiplicative processes during carbonate gravity flow sedimentation. The microfacies analysis suggests that most of the examined samples represent allochthonous bioclastic material that has been transported from a nearby platform/reef environment of deposition. In this case, the depositional environment should be defined as a top of slope or toe of slope environment, where microbrecciated or brecciated deposits rested and accumulated. The nature of the bioclasts and lithoclasts that constitute the respective deposits represent shallow shelf environments, thus the allochthonous material originated from the platform.

Resuspension or slumping of platform edge sediments produced turbidity currents (calciturbidite unit) that were time-equivalent to the debris flows (breccia unit) formed by the slumping of the platform margin. Breccia deposits and calciturbidites with Ta to Tc sub-divisions are more proximal deposits, whereas microbreccia and calciturbidites with the complete Bouma sequence were located in more distal positions from the source. By the uppermost Cretaceous, reefs built up on the platforms within the Ionian basin (Fig. 25) and contributed detritus to the microbreccia/breccia unit.

Following the facies analysis and the suggested depositional environments and their conditions indicated that the Ionian Basin was influenced by intense tectonic activity during the early Cretaceous. Synthetic and antithetic faults caused the formation of asymmetric grabens with their uplifted shoulders serving as major sediment contributors into the basin. As a result, a significant amount of coarse-grained material was delivered into the basin. During the late Cretaceous, the shoulders of these asymmetric grabens were most active causing erosion of the pre-existing deposits of Lower Cretaceous "Vigla Formation", developing the channelized microbreccia and breccia. The basin asymmetry and variations of water depth resulted in variable thicknesses of the breccia/microbreccia channels and calciturbidites.

The early Cretaceous to early Eocene depositional history in the Ionian Basin indicates that the regional tectonic activity, rather than the eustatic sea-level changes, was the major factor that influenced the basin evolution, suggesting a syn-rift stage being active from the Jurassic to the early Eocene.

Speaker Biography

Avraam Zelilidis was graduate Geologist in 1984 and earned PhD in 1988 from the Department of Geology of the University of Patras. He was appointed as a lecturer in 1993 and since 2009 as a full professor in the Department of Geology of the University of Patras. He served as Dean of the Faculty of Natural Sciences at the University of Patras from 2006 to 2010. Research deals with the Analysis of Sedimentary Basins, Sequence Stratigraphy, Seismic Stratigraphy and Petroleum Geology. Have produced many research projects for oil companies using data in both surface and subsurface, while he organized many field seminars for foreign oil companies. He has published more than 100 papers in International journals, most of which refer to the Hydrocarbon potential in Greece and have been presented in International conferences in an effort to highlight the issue of existence-exploitation of Hydrocarbon fields in Greece.

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Rafael Andrello Rubo

Universidade de São Paulo, Brazil

Digital Petrography: Mineralogy and porosity identification using machine learning models

Microscopic petrographic analysis allows evaluating depositional environments and diagenetic processes from sedimentary basins. The results of these analyses, therefore, contribute to an enhanced reservoir characterization and guide the oil and gas exploration.

Images acquired from thin sections in the visible spectrum are used as input to create three sorts of machine learning models: 1. Image segmentation models with representative classes of the rock mineralogy and porosity; 2. Object detection models to automatically identify features of interest, such as phosphatic fragments; and 3. Classification models for labeling images with different porosity types. Systematical application of these models in new images standardizes descriptions and reduces subjectivity and human errors during thin section analysis. Convolutional filters were applied in all the models, followed by machine learning classification algorithms, such as artificial neural networks and random forest. Datasets used for training are from thin sections of carbonate rocks, which are prepared from sidewall core samples of oil wells, specifically from the pre-salt reservoirs of Santos Basin, on the southeast coast of Brazil. Evaluation of the models' abilities to generalize is done through the use of 10-fold cross-validation tests and by correlation with other sources of data, such as chemical microanalysis. Results show high percentages of correctly classified instances during cross-validation. Correlations indicate low root mean square errors and elevated coefficients of determination.

Speaker Biography

Rafael Andrello Rubo is a geologist working at Petrobras, a Brazilian multinational energy corporation, where he conducts stratigraphic studies applying data science. He was graduated from Universidade Estadual de Campinas and participated in an exchange program at University of Missouri. He is pursuing a master's degree in Petroleum Engineering at Universidade de São Paulo. He has also taken an MBA course at Fundação Getúlio Vargas in Finances and Investment Management, and he is also post-graduated in Mineral Metallurgical Systems at Universidade Federal de Ouro Preto.

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Fayez Al-Mezel

Kuwait Oil Company, Kuwait

Operating budget optimization: "Approach and value"

In recent years, the operating costs have been increasing substantially in the oil and gas industry. Due to oil prices drop, petroleum companies are implementing a new cost performance culture to ensure cost optimization targets are met. This paper presents a methodology to optimize the costing and spending while still achieving the corporate targets. Thus, a study was done to evaluate the spending of an oil and gas corporate in order to reduce cost of operation. The following six-approach methodology was developed to review and guide the study forward: Review the corporate historical budget and spending to identify reasons behind the annual increase of the requested budget and the actual spending review and analyze major corporate budget elements analyze and review the major cost elements, and major functions impacted by these cost elements Identify major findings. Translate findings into Corporate level recommendations and specific functions recommendations. Convert recommendation after management approval into initiatives and key performance indicators. By publishing this study, it will assist corporates in updating their current processes and establishing new one to optimize their spending and at the same time not affecting their plan to meet their strategic objective.

Speaker Biography

Fayez Al-Mezel was graduated in McGill Engineering, Montreal, Canada. He has started his career in Schlumberger as wireline Engineer. After his experience in Schlumberger. He joined in Kuwait Oil Company as Senior Strategic Planner TPL Specialist I (Planning) in 2015 and now he is the Planning Specialist in Kuwait Oil Company, Kuwait.

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