Meetings International SciTechnol

Abdelaziz Khlaifat, J Chem Appl Chem Eng 2018, Volume: 2
DOI: 10.4172/2576-3954-C1-001

International Conference on

PETROLEUM ENGINEERING

August 06-07, 2018 | Dubai, UAE

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Underbalanced drilling (UBD) technology for tight gas reservoirs

With the increased global demands on oil and gas, operators strive to maximize production by conducting more advanced drilling operations, such as extended reach, horizontal and high-pressure/high-temperature (HP-HT) drilling and are expanding globally into drilling unconventional resources. Unconventional gas resources offer significant gas production growth potential in the coming years, currently accounting for more than 43% of the US gas production. Tight Gas Sands (TGS) represents approximately 70% of the unconventional production and significant reserves are yet to be developed. Hydraulic fracturing of the deviated wells was the method of choice, in the late 80's, for developing tight gas reservoirs worldwide. In the 90's horizontal drilling became common practice as new drilling technology developed and proved to be very successful in many tight gas fields. However, conventional drilling operations caused reservoir formation damage that prevented the identification the gas production potential and resulted in missing some of the gas reservoirs. Underbalanced drilling (UBD) technology was introduced in the 90's to minimize and prevent drilling problems associated with total losses into tight reservoirs. As a result, significant productivity gains were observed and this became a key driver to apply UBD technology in tight gas reservoir drilling. This paper provides a technical overview of the state of the art UBD technology used to develop unconventional tight gas reservoirs.

Biography

Abdelaziz Khlaifat is the Head of Petroleum Engineering Department at Abu Dhabi Polytechnic and AD Poly SPE Students Chapter Advisor. Prior to joining AD Poly, Abdelaziz worked as a Research and Development Manager of Dhahran Research Center at Weatherford International (Geoscience Development). Erstwhile, he worked as a Senior Reservoir Engineer, specialized in an unconventional resources (tight and shale gas) at Weatherford Saudi Arabia. Before joining Saudi Arabia office, he worked as a senior reservoir engineer (modeling and simulation) in the reservoir engineering group of the Weatherford Well Engineering Center of Excellence in Dubai. He obtained his BSc degree in Petroleum Engineering (1990) from Moscow Institute of Oil and Gas, Moscow-Russia, Master of Chemical Engineering and PhD in Chemical/Reservoir Engineering from Illinois Institute of Technology, Chicago-USA in 1994 and 1998, respectively. Before joining Weatherford, he had held different positions in the academia. In 2009 he was promoted to a full professor of chemical engineering at Mutah University, Jordan. Abdelaziz is actively involved in scientific research and development of novel methodologies and techniques in tight and shale gas reservoirs, shale gas resource development workflow and tight gas staged field experiments. He has authored/coauthored over 85 publications, including journal articles, book chapters and specialized conference proceedings in the areas of flow through porous media, hydrocarbon reservoir engineering, unconventional tight and shale gas, managed pressure drilling, non-aqueous phase Liquid transport, photocatalysis, two phase flow modeling and simulation, and Dead Sea related-research. He is an active member of the SPE, AIChE, JGA, JES, JEA, AHWA and SFERA.

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