

New Advances in Reservoir Monitoring

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Abstract:

As improved recovery from old reservoirs and effective production from new reservoirs gain importance, monitoring changes in the reservoirs and producing from them in an optimum manner becomes crucial. Geophysical data have proven to be an important tool for obtaining information about the reservoir properties away from the existing wells. Such information is not only crucial for characterizing oil and gas reservoirs and developing the field, but also in many other stages of reservoir life from its exploration to its abandonment. I will introduce many uses of geophysical data in general and seismic data in particular for reservoir monitoring related work. Some of the key aspects of this lecture include:

- 4D volumetric inversion to monitor reservoir pressure, saturation, and permeability changes
- Integrated reservoir model updating and history matching using different types of geophysical data (e.g. time lapse seismic, borehole gravity, borehole to borehole tomography, three component data and controlled source electromagnetics)
- Passive seismic monitoring with a focus on monitoring hydrofrac process in shale oil and gas reservoirs
- Seismic acquisition, processing and analysis for CO₂ sequestration & monitoring
- Special issues for reservoir monitoring of mature oil fields, including the carbonate reservoirs and how the effectiveness of the EOR process could be monitored
- Monitoring high temperature and / or high pressure reservoirs including those in the deep water fields.

This lecture will provide a good understanding of the state of the art of geophysical monitoring of oil and gas reservoirs and their cost / benefit. The one thing I hope the engineers to think about after attending this lecture is: In dealing with reservoir monitoring issues or getting handle on a reservoir property away from the borehole, how geophysics can help?

Biography:

Dr. Fred Aminzadeh is professor of Petroleum Engineering at the University of Southern California and Director of USC Reservoir Monitoring Consortium (rmc.usc.edu). He is also on the advisory board of Saratoga Resources. His technical interests include: reservoir characterization / monitoring, smart oil fields, passive and 4D seismic, fractured reservoir, and geothermal. He was the president of Society of Exploration Geophysicists (2007-2008). He worked in technical and management positions at Unocal (now Chevron) and was president and CEO of dGB-USA. He served on the NSF National Research Council and the DOE's Unconventional Resource Technology Advisory Committee (URTAC). He has given many industry courses, keynote speeches, webinars, and interviews on both technical and strategic issues on various aspects of geophysical technologies in many countries. He led \$25 MM 3D Seismic Modeling project, receiving the 2005 SEG Special Commendation Award. He also led the industry sponsored DeepLook Prediction Team. He holds 3 US patents, authored 12 books and over 350 papers on pattern recognition, image processing, neural networks, fuzzy logic, 3D seismic modeling, seismic attributes, advanced seismic data processing, AVO, gas chimneys, absorption and reservoir characterization. He received the SPE 2011 Western North America Regional Award for Reservoir Description and Dynamics. He holds a Ph.D. degree from USC.

