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PETROLEUM ENGINEERING DEPARTMENT

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Applications of Distributed Fiber Optic Sensing Technology in Offshore Environments – Current State and Future Directions

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Abstract:

Over the past few years, the oil and gas industry has seen a rapid increase in the deployment of distributed fiber optic sensing (DFOS) for real-time downhole monitoring. Having an inherent tolerance for high temperatures and pressures, chemical passivity, corrosion resistance and distributed sensing capability, DFOS has the potential to address many of the subsea sensing challenges. Because intervention costs are exceedingly high in offshore operations, the use of non-intervention data gathering using DFOS, can also save an operator millions of dollars in operating expenses.

In this presentation, I will discuss some field case studies of DFOS applications in offshore environments. I will also present results from cutting-edge research in DFOS currently being conducted at Louisiana State University (LSU), including:

- DTS/DAS to Detect Gas in Riser: As North America's only full scale well testing center, an experimental well at the Petroleum Engineering Research and Technology Transfer Lab, at LSU, was utilized to monitor gas rise using DFOS in circulating muds to simulate well control scenarios at a field scale in offshore drilling riser environments. DTS and DAS were integrated with surface gauges to monitor the rising gas.
- Machine Learning for DAS Interpretation: One of the greatest challenge posed by DAS is the enormous amount of data it generates. At LSU, we have developed deep learning image-recognition algorithms using Convolutional Neural Network for DAS interpretation. Application of machine learning will enable efficient processing and interpretation of large DAS data sets in real-time.
- Integrated DTS and Reservoir Simulation Modeling: Reservoir simulation models are typically history matched with past production, to predict field performance. We have developed automation workflow to history match fiber optic DTS data, to predict production. This gives added reliability to prediction results.

Biography:

Dr. Jyotsna Sharma joined the department of Petroleum Engineering at Louisiana State University as an Assistant Professor in 2019, after working in the oil industry for Chevron, Schlumberger and Shell. Her primary areas of research are fiber optic sensing, EOR, and data analytics. She previously worked as a Research Engineer at Chevron and led projects in US, Indonesia, Canada and Venezuela. Prior to that she has worked as a Field Engineer at Schlumberger, Visiting Scholar at Stanford University and Research Intern at Shell. She holds a Ph.D. in Petroleum Engineering from University of Calgary and B.Tech. in Electrical Engineering from Indian Institute of Technology, Delhi.

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