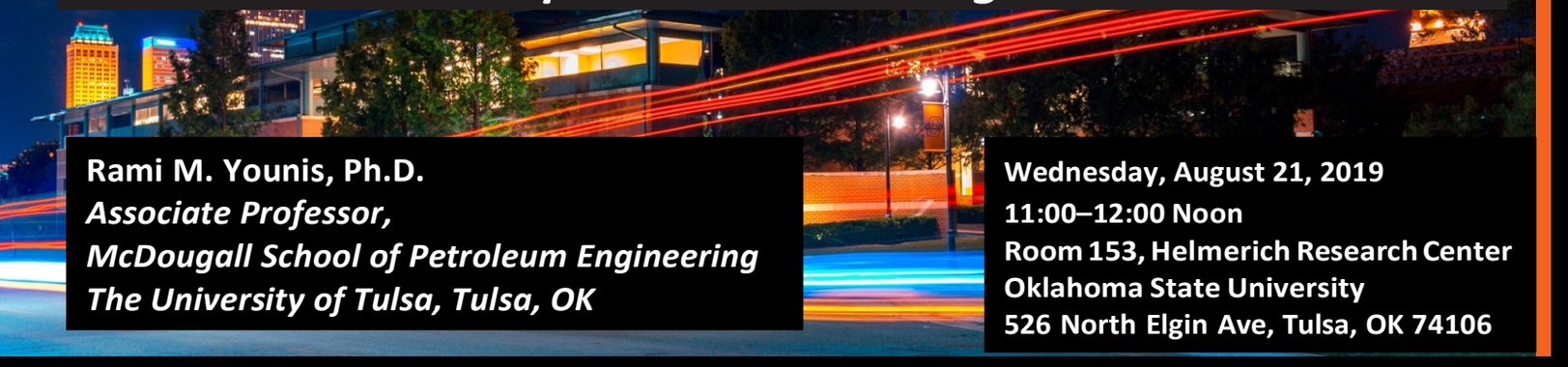
School of Materials Science and Engineering
Oklahoma State University

Prospects for targeted enhanced permeability due to rock damage *via* engineered seismic-wave interactions: *A computational investigation*



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Wednesday, August 21, 2019
11:00–12:00 Noon
Room 153, Helmerich Research Center
Oklahoma State University
526 North Elgin Ave, Tulsa, OK 74106

ABSTRACT

Our ability to extract hydrocarbons from unconventional subsurface reservoirs is dictated at first-order by the creation of permeable volumes and flow paths under pore-pressure depletion. To date, hydraulic fracturing remains to be the sole engineering mechanism employed to achieve this. Serious concerns pertaining to the resulting low recovery efficiency, reliability in terms of characterization, and risk associated with water disposal are well-recognized by industry and society. This talk presents theoretical efforts to study the prospects of an alternative technology to augment or potentially supersede hydraulic fracturing as a main staple.

Comminution of consolidated porous media is a well-studied phenomenon that is observed in several engineering contexts, including mining, tunneling, and projectile impact. Due to the local release of kinetic energy associated with high shear-strain rate of dynamic deformation, rocks have been observed to fail, and lead to significant permeability enhancement. These observations focus on damage that is local to the source of momentum. In this study, we investigated multiple and shaped source scenarios to affect targeted comminution in low permeability formations caused by the interaction of between the induced seismic pulses. A computational investigation considers a hypothetical laboratory-scale experimental set-up and the results suggest that the characteristic scales of the process are promising.

SPEAKER

Rami M. Younis is an Associate Professor at the McDougall School of Petroleum Engineering at The University of Tulsa. He is the Founder and Director of the Future Reservoir Simulation Systems & Technology (FuRSST) industrial research consortium. At FuRSST, he is working towards a future where predictive numerical simulators will literally write themselves, exploit their own insights into physics in order to expedite computation, and aid in the invention of breakthrough technologies.

Dr. Younis currently serves as Associate Editor for the Society of Petroleum Engineers Journal, Guest Editor for the Journal of Petroleum Science and Engineering, and as Chairperson of the SPE Reservoir Simulation Conference to be held in 2020. He is a recipient of the SPE Young Faculty Research award..

Dr. Younis holds a PhD degree in Petroleum Engineering and two MS degrees in Scientific Computing & Computational Mathematics and in Petroleum Engineering, all from Stanford University. He received a B.Eng. degree with Honors in Mechanical Engineering from McGill University in Canada.