Chemical and Petroleum Engineering

Mojdeh Rasoulzadeh

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Dr. Mojdeh Rasoulzadeh is an assistant professor in the department of Mathematics at the University of Alabama. She joined the Applied Math group in last fall to expand the collaboration with Alabama Water Institute and National Water Center in the area of subsurface flow modeling in heterogeneous reservoirs. Her research is focused on the semi-analytic, multi-scale, multi-physics models of flow in highly heterogeneous porous media.

Mojdeh has received her bachelor's and master's degree in mechanical engineering from Tehran and Sharif University of Iran, respectively. She received her PhD in Mechanics and Energetics from Lorraine University in France funded by Schlumberger SRPC. Her PhD dissertation entitled "Nonlocal models of flow in multi-scale fractured porous media". She completed a postdoctoral research position with Schlumberger's SRPC in France on the modeling of flow in fractured/vuggy reservoirs. Later, she was recruited as a research engineer of Ecole des Ponts ParisTech and affiliated to Total CSTJF research center to work on the problem of coupled reservoir-geomechanical modeling of faulted reservoirs.

"Semi-analytic Models of Flow in Multi-scale Fractured/Vuggy Reservoirs"

Abstract

Naturally fractured hydrocarbon reservoirs provide more than 20% of the world's oil reserves and production. Fractures and vuggy inclusions of different size and scales are scattered through the naturally fractured reservoirs and significantly influence the overall flow regime. The conventional models such as co-existing continua approaches and Warren and Root dual-porosity model in most of the cases are an over-simplification and cannot be applied to most of the naturally fractured reservoirs. The interaction between the fracture network and surrounding porous rock is highly affected by the properties of fractures and vugs such as length, conductivity, aperture, spacing, orientation, etc.

In this talk, the general effective model of flow in a multi-scale fractured medium obtained by two-scale homogenization technique is presented. For the special case of two-scales of in-homogeneities and certain parameter sets, such as matrix-fracture permeability ratio and certain fracture aperture, etc., this general model reduces to classic dual porosity model. The role of presence of additional scales of inhomogeneity such as micro-fractures and vuggy inclusions, on the effective flow models are discussed. The effective models of flow in case of large-scale vugs and fractures are presented as the solution to the coupled Darcy Stokes/Navier Stokes equations.

Tuesday, April 24th

10:00 – 10:50AM

Spahr Auditorium