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Numerical simulation of water flooding in natural fractured reservoirs under poro-elastic conditions

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A numerical method is employed to investigate the fluid flowing dynamics in fractured reservoirs in this paper. This paper proposes a combination of discrete fracture network model (DFN) and single continuum model for effective permeability tensors, which is used to simulate the flow in fractured reservoirs with multi-scale fractures and proved feasible.

In the first part of the paper, implicit flow equations of oil and water phase in both fractures and matrix are established to consider the non-linearity of oil and water properties which depend on pressure. Then the finite element method based on the unstructured grid system an Newton Raphson iteration are used to obtain the numerical solution. Moreover, the accuracy of this simulator is proved through synthetic cases.

The proposed method is applied on a part of producing fractured basement hydrocarbon reservoirs in India. The results show that the existences of complex fracture networks have great impacts on water flooding. Compared with the homogeneous reservoir, natural fracture (micro and large scale) networks can change the direction and velocity of the water front, which finally leads to the more serious water break through, higher water-cut and less recovery.

Biography:

Dr. Reda Rabiee Abdel Azim holds his PhD from the University of New South Wales, Australia 2015, M.Sc. and B.Sc. from University of Cairo, Egypt in 2005 and 2010 respectively, all in Petroleum Engineering. Prior joining American University of Ras Al Khaimah as an assistant professor and chemical and petroleum engineering department chair, Dr. Reda Abdel Azim worked with Schlumberger and Technical Petroleum Services Companies.