Omar Akash et al., Int J Petrochem Res. 2018
http://dx.doi.org/10.18689/2638-1974.a2.005

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2nd International
Oil and Gas Conference

December 3-5, 2018 Dubai, UAE

A Lattice Model to Research the Interaction between Hydraulic Fracture and Natural Fracture

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The Bakken Formation deposited in the Williston Basin is a formation with high oil reserves.It consists of lower, middle and upper layers, the middle layeris the main oil reservoir and is characterized by its low porosity and permeability.Recent developments in completion and stimulation technologies related to horizontal drilling and hydraulic fracturing have put North Dakota in the second place in the United States after Texas in oil production. The cost of conducting a hydraulic fracturing job can reach millions of dollars, also more efficient hydraulic fractures can dramatically increase oil production rate. Therefore, the benefits of studying the different engineering and geological parameters that affect hydraulic fracturing are enormous. Complex interacted parameters control the geometry of the hydraulic fracture. Some of these parameters include natural fractures, rock properties, fluid rheology, perforators design, and pumping schedule.This paper presents a numerical study of the interaction between hydraulic fracture and natural fracture. Natural fracture with varying mechanical and geometrical properties can affect the propagation of hydraulic fracture. A lattice model is employed in this study that coupled fluid flow with rock deformation and breakage, which can capture the hydraulic fracture propagation patterns on the injection rate, intersection angle, fluid viscosity, differential stress. Comparing the simulation results with experimental results to verify the accuracy of simulation results.

Biography:

Omar Akash holds BSc. Degree in Mechanical Engineering, MSc. Degree in Engineering Project Management and is currently pursuing his PhD degree in Petroleum Engineering in University of North Dakota. Omar has three years of professional experience as a research and development engineer at the American University of Ras Al Khaimah, UAE. His current research interest includes hydraulic fracturing and the design of perforates in hydraulic fracturing.