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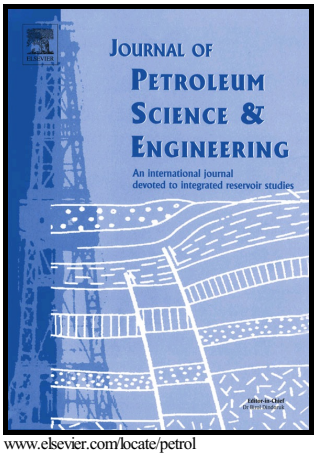

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Simulation of Planar Hydraulic Fractures with Variable Conductivity Using the Embedded Discrete Fracture Model

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Abstract

Hydraulic fracturing is a well stimulation technique used to improve well productivity index; this technique has been widely applied in unconventional reservoirs (tight gas and tight oil). In this paper we describe a method we developed to couple hydraulic fracture modeling software with the embedded discrete fracture model (EDFM). To allow simulation of varying conductivity in a fracture plane we improve the EDFM by defining a new transmissibility equation to handle flux between fracture blocks of a single fracture plane. In our methodology we use the EDFM and calculate fracture blocks connections using a transmissibility equation which allows varying aperture and permeability (conductivity) in the fracture plane. Additionally, we developed and implemented a methodology that allows the discretization of fracture planes with heterogeneous conductivity in a Cartesian grids. Two systems of coordinates, a real and a normalized system, were defined into the fracture plane to translate hydraulic fracture properties to the EDFM preprocessor. The hydraulic fracture plane is normalized by its length and height; fracture properties (aperture and permeability) from the continuum plane are assigned to normalized coordinates and translated to the Cartesian grid. Hydraulic fracture planes are embedded using our EDFM preprocessor, which allows the modeling of fractures with different geometries distributions. In the results the proposed transmissibility equation was verified

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