Determination of Inflow Performance Relationship for Naturally Fractured Reservoirs: Numerical Simulation Study

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Abstract : The Inflow Performance Relationship (IPR) of a well is a relation between the oil production rate and flowing bottom-hole pressure. This relationship is an important tool for petroleum engineers to understand and predict the well performance. In the petroleum industry, IPR correlations are used to design and evaluate well completion, optimizing well production, and designing artificial lift. The most commonly used IPR correlations models are Vogel and Wiggins, these models are applicable to homogeneous and isotropic reservoir data. In this work, a new IPR model is developed to determine inflow performance relationship of oil wells in a naturally fracture reservoir. A 3D black-oil reservoir simulator is used to develop the oil mobility function for the studied reservoir. Based on simulation runs, four flow rates are run to record the oil saturation and calculate the relative permeability for a naturally fractured reservoir. The new method uses the result of a well test analysis along with permeability and pressure-volume-temperature data in the fluid flow equations to obtain the oil mobility function. Comparisons between the new method and two popular correlations for non-fractured reservoirs indicate the necessity for developing and using an IPR correlation specifically developed for a fractured reservoir.

Keywords : inflow performance relationship, mobility function, naturally fractured reservoir, well test analysis

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