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A general analytical method for transient flow rate with the stress-sensitive effect

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Abstract: The permeability of deep-seated reservoirs and aquifers usually changes with formation pressure; however, the widely used analytical method assumes constant permeability, resulting in significant errors in flow rate prediction. This work extended the conventional analytical method to consider the effect of stress-sensitive permeability. The proposed analytical method was validated by comparing analytical flow-rate solutions for vertical wells with numerical flow-rate solutions. The production rates of a multi-stage fractured horizontal (MSFH) well with and without the effect of stress-sensitive permeability were obtained. A field case of an MSFH well was used to test the applicability of the proposed analytical method. It was found that the stress-sensitive effect negatively affected production rates of the MSFH well for the whole flow period, increasing with increasing drawdown pressure and permeability modulus. The proposed method is appropriate for various well types and reservoir scenarios. Compared with the conventional method, the proposed method can be employed to obtain more accurate production rates with little increase in the

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