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Oil and Gas Well Evaluation Using the Reciprocal Productivity Index Method

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Abstract

The ability to estimate descriptive engineering parameters, such as permeability, and to generate production forecasts and estimated ultimate recovery based on those parameters, without the cost of full numerical simulation or extended build-up tests, is provided by the Reciprocal Productivity Index (RPI) graphical production analysis method. The method's theoretical basis arises from the fact that the traditional constant rate or constant pressure boundary conditions are sufficient, but that the necessary boundary condition only requires that the outflow face transmissibility remain constant over time. With that difference, it is possible to accurately evaluate production histories, in which both the rate and the producing pressure are varying over time, using traditional well testing methods. Examples for both oil and gas wells demonstrate the interpretive capability and limitations. The parameters derived from the RPI method are testable for sensitivity and reasonableness. The forecasts can also be used to test the benefits of changes in operating pressure, pump inlet level or stimulation. When relatively noise-free data sets are available, it is possible to derive geologic and other production engineering information from them.

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