

FRACTIONAL FLOW ANALYSIS USING A DUAL-PERMEABILITY FRACTAL MODEL WITH FORMATION CROSS-FLOW

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A dual-permeability fractal model is presented to simulate fluid flow in fissured dual-permeability system composed of Medium 1 and Medium 2. For this model, groundwater flow originates only from Medium 1 on the pumping well. The model considers wellbore storage and skin effects at the pumping well and then shows exact drawdown at the early time of pumping. Fluid flow in the fissured media may be controlled by complex fracture network, and by more conductive fractures which are only small fraction of all fractures. Because of this, the fractal fracture models could not be related with the fractal models on fractional flow directly. In addition, dual-porosity model cant not exactly delineate the behavior of two superposed aquifers which have different hydraulic conductivity each other. Type curves for different flow dimensions and for two cases are presented. The case 1 demonstrates the aquifer system which consists of Medium 1 having low permeability and high specific storage and Medium 2 having high permeability and low specific storage. The case 2 is inverse to the case 1. Dimensionless drawdown curves in Medium 1 and Medium 2 shows characteristic trend each other. The analysis of a field example using this model shows good agreement between the theoretical values and the observed data on the observation wells as well as the pumping well. A flow dimension of 1.8 is obtained.