

On the Well Test Characterization of Triple Porosity Oil Reservoirs with Global Optimization

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We study the numerical methods used to solve (1) the PDE system that simulate the flux of oil in a Triple Porosity reservoir and (2) the inverse problem for identifying the porous media parameters. We discuss the characteristics of the inverse optimization problem and the compare the results obtained with a Genetic Algorithm and a Gauss-Newton type method. We explain the need for a global optimization procedure called “The Tunneling Method”, that improves the convergence to a local minimum, and that is able to get several optimal solutions with good match to the data. We also study the advantages of solving the inverse characterization problem in the Laplace space, and the numerical methods involved. We present numerical results on an exhaustive set of synthetic well test data, to show the robustness, efficiency, speed and the ability to forecast the production of the well of the proposed methods.