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Simulation study to account for the anisotropy due to oblique fractures in fractured porous media

The presence of fractures in the fractured porous media requires the use of appropriate numerical methods to consider their effects. The conventional approach in simulating fracture reservoirs is to use the Warren and Root model which assumes a homogeneous medium. In reality, the presence of heterogeneous reservoirs with complex characteristics causes a large deviation in the results of the basic models with the field results. In this work, the method of considering the anisotropy due to the presence of oblique fractures with respect to the flow direction is investigated with a numerical approach. One way to include this factor is to consider the effective correction factor to generalize Warren Root's approach. Modeling is done in COMSOL Multiphysics software, which has been investigated using single-phase and two-phase models. The simulation results under the same boundary conditions and rock and fluid properties show that different equivalent correction coefficients are obtained for fractures with different angles. Examination of the fluid pressure inside the fracture network shows that this equivalent coefficient depends on the fracture orientation, matrix shape and size and the density of the fractures. The results of this study can be used for the suitable simulation of heterogeneous fracture reservoirs.

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Track Classification: Geotechnique/Soil Mechanics