عنوان مقاله:

A Comparison between Different CFD (Computational FluidDynamics) Turbulent Models to Estimate Gas Transmissivity

محل انتشار:

سومین کنفرانس بین المللی دستاوردهای نوین پژوهشی در شیمی و مهندسی شیمی (سال: 1395)

تعداد صفحات اصل مقاله: 8

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خلاصه مقاله:

Since accurate estimation of the amount of the transmissivity decrease with increase at the flow rate within the gas reservoirs is crucial for its future development, aim of this study is to develop a CFD (Computational Fluid Dynamics) model to simulate the non-Darcy flow at a single fracture. For this purpose, the geometry of the fracture surfaces and its aperture are adopted from an open literature andby employing the finite volume technique, a static model is provided for further simulations. Then, three different turbulent models are used to simulate the fluid flow within the fracture. These models include both two-parameter models such as: Realizable k-ε, and SST (Shear Stress Transport) k-ω models and a fully calculating Reynolds Stress model named RSM (Reynolds Stress Model). Meshing refinement wasadopted to reduce the initial transmissivity obtained by the model with that from the experimental results. Outcomes of our study revealed that onset of the non-Darcy flow based on the Reunolds number is somewhere between 1 and 10. Also, it was observed that the Realizable k-ε comes up to the lowest relative error over the β by RE (Relative Error) of about 9.3%. The SST k-ω model results in the highestRE of about 18.4% while the error for the RSM is about 10.9%. Therefore, superiority of the Realizable k-ε model over the two other methods is justified for the simulation of the non-Darcy flow within the fracture network.

کلمات کلیدی:

CFD (Computational Fluid Dynamics), Single Fracture, Turbulence, Realizable k-ε,SST k-ω, RSM