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# The Effect of Power Law Index on Shift Factor for Shear Thinning Fluids by 3D Microscale Flow Simulation

Wednesday, 1 June 2022 14:50 (1h 10m)

The flow of non-Newtonian fluids through porous media is of great importance for various applications, such as heavy oil recovery, polymer enhanced oil recovery, and liquid polymer molding. Understanding these processes, however, is a challenging task as the topology of the pore space results in a wide range of flow velocities and shear rates and consequently to variation of effective fluid viscosity in space and time. A common approach for the slow flow of a non-Newtonian fluid through a porous medium is to lump all non-Newtonian effects into a parameter called the porous medium viscosity. This parameter depends on the properties of both the fluid and the porous medium, including a shift factor that expresses the relationship between the porous medium and bulk viscosities. In this work, we investigate the effect of the power-law index ( $n$ ) on the shift factor for the flow of shear-thinning fluids through rock samples with varying pore structure and heterogeneity. Direct simulations were performed on micro-computed tomography ( $\mu$ -CT) images of several sandstones and carbonates using a non-Newtonian package based on OpenFOAM. It was found that for small values of  $n$ , the value of shift factor was very large, and with increasing the value of  $n$ , the shift factor decreased. In addition, for samples with low formation factors (samples with low complexity), the value of shift factor was obtained to be close to one for a wide range of  $n$ . However, for samples with large formation factors (sample with very high complexity), the value of shift factor was significantly larger, and the value of shift factor greatly increased for small values of  $n$ .

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## References

## Time Block Preference

Time Block A (09:00-12:00 CET)

## Participation

Online

**Primary authors:** AMIRI, Mehdi; QAJAR, Jafar; QASEMINEJAD RAEINI, Ali (Research Associate)

**Presenter:** AMIRI, Mehdi

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