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Transport and Deposition of Nanoparticles in the Pore Network of a Reservoir Rock: Effects of Pore Surface Heterogeneity and Radial Diffusion[1] NGOC PHAM, DIMITRIOS PAPAVASSILIOU, The University of Oklahoma — In this study, transport behavior of nanoparticles under different pore surface conditions of consolidated Berea sandstone is numerically investigated. Micro-CT scanning technique is applied to obtain 3D grayscale images of the rock sample geometry. Quantitative characterization, which is based on image analysis is done to obtain physical properties of the pore network, such as the pore size distribution and the type of each pore (dead-end, isolated, and fully connected pore). Transport of water through the rock is simulated by employing a 3D lattice Boltzmann method. The trajectories of nanopaticles moving under convection in the simulated flow field and due to molecular diffusion are monitored in the Lagrangian framework [1]. It is assumed in the model that the particle adsorption on the pore surface, which is modeled as a pseudo-first order adsorption, is the only factor hindering particle propagation. The effect of pore surface heterogeneity to the particle breakthrough is considered, and the role of particle radial diffusion is also addressed in details.

[1] Voronov, R.S., VanGordon, S., Sikavitsas, V.I., and D.V. Papavassiliou, *Int. J. Num. Methods in Fluids*, **67**, 501-517, 2011

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