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Effect of grain size and distribution on the two-phase flow at pore scale

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The size and distribution of grain have great influence on the micro-scale displacement mechanisms. Coupled Cahn–Hilliard phase field and Navier–Stokes equations were solved using finite element method to simulate two-phase flow in homogeneous and heterogeneous models, respectively. Several heterogeneous models were conducted with different heterogeneity intensity and distribution. In both models, the medium porosity and absolute permeability were kept unchanged, compared to the homogeneous case. The micromodels were initially saturated by oil, and the displacing fluids were prepared as aqueous water. The preferred paths and flow morphologies of these models were obviously different. The general trends of the oil recovery factor and macro-scale capillary pressure variations were similar during displacement under different wettabilities condition for different models. However, the homogeneous model showed higher displacement efficiency at water-wet conditions and lower capillary pressures at oil-wet conditions; due to less complexity of its pore network geometry. These findings extend our understanding of the effect of grain size and distribution on water flooding process.

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Time Block Preference

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

Participation

Online

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