Contribution ID: **414** Type: **Poster Presentation**

Effects of porous media morphology on two-phase fluid displacement and distribution

Tuesday, 31 May 2022 15:20 (1h 10m)

The Effects of pore-space morphology on multiphase fluid displacement in porous media has been studied extensively in literature (1-3). The general understanding is that, among other factors, pore-space morphology controls the type and importance of pore-scale events that occur during multiphase fluid displacement and hence governs the final fluid saturation distribution. In this research we performed direct numerical simulation using OpenFoam to investigate the influence of erosion and dilation of grains on the dynamics of immiscible displacement. Erosion and dilation operations were progressively performed on the original model. These morphological operations modify the objects (here grains) present in an image by shrinking or growing them in a specific direction. For erosion, a set number of pixels are removed from the object boundaries (open pore space) while for dilation a set number of pixels are added to the object boundaries (tighter pore space). Using erosion/dilation operations one can design porous structures that are similarly interconnected (i.e. have similar skeletons) but display controlled differences in pore and pore-throat size distributions. Our results show that during the drainage, for the dilated models, i.e. the tighter structures, water displacement is more uniform with no single dominant preferential flow pathway. On the contrary, water displacement is less efficient within the eroded models. Moreover, we observed retraction of interface after breakthrough in eroded models which was not visible in dilated models.

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References

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Time Block Preference

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

Participation

Online

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