Contribution ID: **154** Type: **Poster (+) Presentation**

Direct Pore-scale Simulation of Thermal-Hydraulic-Mechanical Coupling Effect on the Process of Waterflooding with FVM Method

Wednesday, 2 June 2021 10:00 (1 hour)

Research on the thermal-hydraulic-mechanical (THM) coupling effect in porous media from the perspective of pore-scale is of great significance for the study of enhanced oil recovery, nuclear storage and geological sequestration of CO2. The flow of multiphase fluid in porous media is affected by the thermal-hydraulic-mechanical coupling effect, and the interaction of multiple fields brings about the complex interface phenomenon between fluid-fluid and fluid-solid and the change of fluid properties. We proposed a Darcy-Brinkman-Biot (DBB) combined with a Conjugate Heat Transfer (CHT) method to model water-oil two-phase flow under the THM effect in porous media. The DBB method was used to simulate the HM process, by characterizing the fluid-structure interaction of two-phase flow in porous media considering matrix deformation. For the free flow in the pore space, the N-S equation was solved, while for the fluid flow in the matrix, the Darcy equation was solved. At the same time, the CHT method was adopted to consider the heat transfer between the matrix and the pore space during the flow process. Good agreements were achieved by comparing our simulation results with the theoretical results through the simulation of the simple classical model, thus verifying our model. Finally, we established two kinds of models, one is an ideal two-dimensional porous media model, and the other one is a slice model extracted from a three-dimensional digital core model based on micron-CT scanned and reconstructed image, to study the effects of different injection PV (pore volume) numbers on the distribution of two-phase fluid, pore structure, and temperature.

Time Block Preference

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

References

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