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ANALYTICAL SOLUTION FOR THE POPULATION-BALANCE MODEL DESCRIBING FOAM

Wednesday, 2 June 2021 15:45 (15 minutes)

Recently a simple but robust model was proposed for describing foam flow in porous media. Numerical solutions to this model were found to be in good agreement with CT scanned nitrogen foam flow experiments in Betheimer sandstone cores, where the foam was stabilized by Alpha Olefin Sulfonate (AOS) surfactant, Simjoo and Zitha 2015. Here, we present analytical solutions for a further simplified version of this population balance foam model. We investigate and classify possible solutions for different injection conditions and varying kinetic foam generation and coalescence parameters, see Lozano et al. 2021. We found that the analytical solutions' behavior changes at the transition between two regions, similar to rarefaction/shock solutions for the Buckley-Leverett equation. Region I presents a traveling wave solution in a good match with two different sets of experimental data. In this region, the analytical solutions also match the original model's numerical simulations. Region II corresponds to solutions as a sequence of waves: one spreading wave and one traveling wave pointing out to flow profiles different from those found in the experiments.

Time Block Preference

Time Block C (18:00-21:00 CET)

References

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