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Type: Oral Presentation

How simplifying capillary effects can affect the traveling wave solution profiles of the foam flow in porous media

Monday, 30 May 2022 16:50 (15 minutes)

Neglecting or simplifying capillary pressure is a common starting point for analyzing the fluid displacement in porous media. From the mathematical perspective, the effect of such simplifications was addressed in the context of conservation laws. In this talk, we address the issue in the context of traveling waves. Mainly, we are interested in the case of one-dimensional incompressible two-phase gas-liquid flow in a porous medium in the presence of foam. We show two physically admissible intuitive simplifications resulting in solutions, which are qualitatively inaccurate in the variable describing foam texture. Besides these examples, we also show one procedure, which produces qualitatively accurate solution approximation. In order to sustain that our conclusions are not connected to any numerical error, we investigate the existence of the traveling wave solutions in all examples. We stress that the profile differences are related to the dynamical system behavior in the phase space. All semi-analytical results were verified through direct numerical simulations, evidencing the applicability of the presented analysis.

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Country

Brazil

References

Lozano LF, Cedro JB, Zavala RV, Chapiro G. How simplifying capillary effects can affect the traveling wave solution profiles of the foam flow in porous media. *International Journal of Non-Linear Mechanics*. 2022: 103867.

Lozano LF, Zavala RQ, Chapiro G. Mathematical properties of the foam flow in porous media. *Computational Geosciences*. 2021 Feb;25(1):515-27.

Time Block Preference

Time Block B (14:00-17:00 CET)

Participation

Unsure

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