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Stability of saturation overshoots for two-phase flow in porous media

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In this talk, we are concerned with the computational analysis of saturation overshoots for two-phase flow in porous media. In particular, it is of interest under which conditions a given saturation overshoot remains stable, while moving through a porous medium. In order to investigate this issue, we consider a decoupled and a fully coupled model, where drainage and imbibition processes are incorporated into the models by means of hysteresis models. Using the decoupled model, we estimate in the Buckley-Leverett limit the speed of the drainage and imbibition front. By these speeds, one can determine the stability of a given saturation overshoot. Moreover, they are used to compute an analytical solution for the saturation, which forms a basis for calibrating the coupled twophase flow model with respect to its boundary conditions and hysteresis parameters. Finally, we address the numerical difficulties that arise when one has to switch between an imbibition and a drainage process or vice versa.

References

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