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An iterative scheme for two-scale phase-field models in porous media.

Tuesday, 1 June 2021 14:40 (15 minutes)

A porous medium is a highly complex domain, in which various processes can take place at different scales. Here we consider a phase-field approach to model the evolution of the evolving interfaces at the micro-scale. After applying a formal homogenization procedure, a two-scale phase-field model is derived, describing the averaged behavior of the system at the Darcy scale (the macro-scale). In this two-scale model, the micro and the macro scale are coupled through the calculation of the effective parameters.

Although the resulting two-scale model is less complex than the original, the usual numerical strategies remain computationally expensive. Here, we propose an adaptive two-scale scheme involving different techniques to reduce the computational effort without affecting the accuracy of the simulations. These strategies include iterations between scales, an adaptive selection of the elements wherein effective parameters are computed, adaptive mesh refinement, and efficient non-linear solvers.

Time Block Preference

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

References

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