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Description of multiphase flows in porous media using an effective convective Cahn-Hilliard equation RAJAGOPAL VELLINGIRI, MARC PRADAS, Department of Chemical Engineering, Imperial College London, UK, MARKUS SCHMUCK, School of Mathematical and Computer Sciences and the Maxwell Institute for Mathematical Sciences, Heriot-Watt University, UK, SERAFIM KALLIADASIS, Department of Chemical Engineering, Imperial College London, UK — Immiscible two-phase flows in porous media find a variety of applications such as microfluidics, oil extraction from reservoirs and chromatography, to name but a few. In this study, we investigate the dynamics of interfaces in porous media using an effective convective Cahn-Hilliard equation which was derived in [1] from a Stokes-Cahn-Hilliard equation for microscopic heterogeneous domains by means of a homogenization methodology. We consider different types of microstructures, including periodic and non-periodic, observing that the macroscopic model is able to retain the microscopic features, hence indicating that our formulation provides an efficient and systematic computational framework to track interfaces in porous media.

[1] M. Schmuck, M. Pradas, G.A. Pavliotis and S. Kalliadasis, 2013 "Derivation of effective macroscopic Stokes–Cahn–Hilliard equations for periodic immiscible flows in porous media," Nonlinearity **26** 3259-3277.

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