Two-Phase Flow in Fractured Media

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Abstract — In a fractured medium, there is an interconnected system of fracture planes dividing the porous rock into a collection of matrix blocks. The fracture planes, while very thin, form paths of high permeability. Most of the fluids reside in matrix blocks, where they move very slow. Let ϵ denote the size ratio of the matrix blocks to the whole medium and let the width of the fracture planes be of the same order as the porous block diameter. If permeability ratio of matrix blocks to fracture planes is of order ϵ^2, microscopic models for two-phase, incompressible, immiscible flow in fractured media converge to a dual-porosity model as ϵ goes to 0. If the ratio is smaller than order ϵ^2, the microscopic models approach a single-porosity model for fracture flow. If the ratio is greater than order ϵ^2, then microscopic models tend to another type of single-porosity model. In this talk, we shall explain these results.