Pore-scale modeling of complex flow behavior during CO2 sequestration

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Abstract

Multiphase flow through porous media has drawn much attention over the past decades, as it is commonly encountered in nature and numerous industrial processes, such as water-alternating-gas (WAG) injection for enhanced oil recovery, geological CO2 sequestration, and remediation of nonaqueous phase liquids (NAPLs) in groundwater. To predict and optimize these processes under different conditions, many relevant multiphase flow properties are required. In this talk, we present the recent development of pore-scale modeling of multiphase flow to understand the complex flow behavior in porous media. Among the flow properties in porous media, the permeability property is the most important parameter to characterize the fluid transport underground, which strongly depends on the pore structure. The heterogeneity of pore structure usually varies significantly across a wide range of length scales, which leads to scale dependence of permeability. We also present an upscaling method allows estimating the large-scale permeability while preserving the effects of fine-scale permeability variations.