

## **CO<sub>2</sub> VERTICAL MIGRATION THROUGH A LAYERED POROUS MEDIUM: DYNAMICS AND UPSCALING**

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**Summary.** We analyze the vertical migration of a CO<sub>2</sub> plume through a periodic layered porous medium made up of high and low permeability layers and initially filled with water. The two-phase flow model is based on the Buckley-Leverett equation including gravity effects. In a first step we show how the flux continuity at the interfaces leads to saturation discontinuities and correlatively to CO<sub>2</sub> stratification as modelled in 2D or 3D aquifers. Then the impact of relative permeabilities discontinuity between layers is discussed and the correlation between the wettability of the layers and the CO<sub>2</sub> saturation spatial distribution is investigated. Finally we propose an upscaled transport model based on homogenization in periodic structures and we compare for different levels of permeability discontinuity the upscaled solution with the exact numerical solution.