THREE DIMENSIONAL HIGH-RESOLUTION SIMULATION OF CONVECTIVE MIXING

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Dissolution by convective mixing is an essential trapping mechanism during CO2 sequestration in deep saline aquifers. Injected CO2 dissolution into the underlying brine leads to a local density increase initially. The resulting CO2-brine mixture is denser than the two initial fluids, leading to a Rayleigh–Benard type instability, which greatly accelerates the dissolution process. While two-dimensional analyses on this phenomenon have elucidated various aspects of the dominant flow mechanisms and mixing scales, full three-dimensional studies are scarce. We present high-resolution, 3D simulations of convective dissolution, and discuss the validity of quantitative results derived from lower-dimensional models.