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Averaging non-slender gravity currents in heterogeneous porous media DANIEL ANDERSON, George Mason University, RICHARD MCLAUGHLIN, CASEY MILLER, University of North Carolina — We explore the slumping of a gravity current in a water-saturated porous medium whose permeability field is periodically heterogeneous. We focus on the non-slender regime in which the height of the gravity current is not necessarily much smaller than its width. Our formulation uses a sharp moving interface that defines the slumping region. We discuss details of how this nonlinear moving interface problem is homogenized with respect to rapidly-varying permeability fields. In this fully two-dimensional setting, we compare numerical computations for the heterogeneous permeability field with computations using a constant effective permeability matrix derived from leading-order homogenization theory. We discuss the connection of this formulation with one which tracks a miscible fluid region without a sharp moving boundary. Finally, we comment on the possibility of incorporating corrections to the leading-order homogenization results.

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