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**Propagation of viscous currents on porous substrate with finite entry pressure**[1] ROIY SAYAG, Dept. of Environmental Physics (BIDR) and Dept. of Mechanical Engineering, Ben-Gurion University, Israel, JEROME A. NEUFELD, BP Institute, Dept. of Earth Science, Department of Applied Mathematics and Theoretical Physics, University of Cambridge, UK — We study the propagation of viscous gravity currents over a thin porous substrate with finite capillary entry pressure. Near the origin, where the current is deep, propagation of the current coincides with leakage through the substrate. At the nose of the current, where the depth reduces below a critical threshold, drainage is absent. Consequently the flow can be characterised by the evolution of the drainage front and the fluid front at the nose. We analyze this flow using numerical and analytical techniques combined with laboratory-scale experiments. We find that at early times the position of both fronts is proportional to $t^{1/2}$, similar to an axisymmetric gravity current without drainage. At later time the growing effect of drainage inhibits spreading. However, as the drainage front approaches a steady position at which the horizontal flux in the current is nonzero the asymptotic propagation of the fluid front approaches a similarity solution $\propto t^{1/2}$, implying a diminishing impact of the draining domain on the propagating nose.

[1]BIDR, BGU, Israel and DAMTP, Univ. of Cambridge, UK

Roiy Sayag
Dept. of Environmental Physics (BIDR) and
Dept. of Mechanical Engineering, Ben-Gurion University, Israel

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