

Abstract Submitted
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Gravity Current in Horizontal Porous Media with A Permeability Gradient¹ ZHONG ZHENG, PEICHUN TSAI, TALAL AL-HOUSSEINY, HOWARD STONE, Department of Mechanical and Aerospace Engineering, Princeton University, COMPLEX FLUID GROUP TEAM — We study the influence of a power-law porosity and permeability gradient on the front propagation of a gravity current in an unconfined porous media. We neglect mass transfer and surface tension on the interface. A similarity solution is found for the propagating front, which is different from the homogeneous case. Experiments have been performed using liquid pushing air in a Hele-Shaw cell with a constant gradient in gap thickness in the vertical direction. We measure the speed of the front and the shape of the interface. We observe a third layer of trapped air in the region where the permeability is low, while it appears that the propagating front still satisfies the similarity solution with a modified coefficient.

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