

Abstract Submitted  
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**Viscous gravity currents in the presence of inhomogeneous ambient flows** MARK LANDERYOU, IAN EAMES, TRISTAN ROBINSON — Many practical situations involve gravity currents moving in external flows. We present a study of gravity currents moving in spatially inhomogeneous flows. We begin by considering the effect of a linear straining flow on the spreading of steady viscous gravity currents originating from localised sources. The spreading of the current is altered by the presence of the external flow; with the cross stream flow acting to reduce the extent of spreading for accelerating flows, and enhance it in the case of decelerating flows. Similarity solutions are developed to describe the spreading behaviour. By applying a conformal mapping technique, these results are generalised to steady viscous gravity currents moving in the presence of a layerwise irrotational ambient flow. These results are illustrated with examples of spreading in the presence of linear straining flows, radial source/sink flows and flows past rigid bodies. The spreading behaviour is described using closed form expressions and near and far field similarity solutions are developed. A laboratory study confirms the salient features of the models used.

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