

Abstract Submitted  
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**Effects of diffusion and tilt on the instability of a buoyant viscous cylinder** JOHN LISTER, DAMTP, University of Cambridge, ROSS KERR, RSES, Australian National University, CATHERINE MERIAUX, School of Mathematics, Monash University — Plumes in the Earth's mantle are cylindrical conduits of buoyant fluid that feed volcanoes such as Hawaii and Iceland. Previous work has suggested that they will break up if tilted over too much by flow in the surrounding mantle. Here the stability of a buoyant cylindrical region of very viscous fluid rising through another very viscous fluid is examined analytically, experimentally and numerically. A linear stability analysis is used for the case of negligible diffusion. Towed-source experiments and simulations based on a novel point-force method are used to show that diffusion, as measured by a Rayleigh or Peclet number, slows but does not eliminate the instability.

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