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Effects of Schmidt number on small-scale instabilities in stratified vortices SURAJ SINGH, MANIKANDAN MATHUR, Indian Institute of Technology Madras — Small-scale instabilities represent mechanisms that lead to complex and often three-dimensional flow features in vortical flows. We use the local stability approach, based on geometrical optics, to explore the effects of Schmidt number (Sc) on the small-scale instabilities in planar vortices with a stable stratification along their vortical axis. Assuming small diffusive coefficients, we investigate the effects of Schmidt number on three different instabilities: centrifugal, elliptic and hyperbolic. A centrifugally stable axisymmetric vortex remains stable in the presence of any out-of-plane stable stratification and arbitrary Sc, whereas, in a centrifugally unstable axisymmetric vortex, the region of instability is shown to increase as Sc is taken away from unity. In an elliptical vortex with a stable stratification, Sc away from unity is shown to non-trivially influence the subharmonic, fundamental and superharmonic inviscid instabilities, apart from introducing a new branch of oscillatory instability that is not present at Sc = 1.

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