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The dispersal, decay and instability of multiple trailing-line vortices PETER DUCK, University of Manchester — We consider a number of aspects concerning the downstream dispersal, decay and instability of systems of trailing-line vortices. Three basic upstream configurations are considered, namely: (i) two counter-rotating vortices; (ii) a four-vortex (symmetrical) configuration; (iii) a symmetrical four co-linear vortex configuration. First the downstream flow evolution is studied, based on a high Reynolds number (long boundary-layer) methodology. This leads to predictions for the translation and decay of the vortex systems, including the asymptotic far-downstream behavior of these types of flow. Second, in cases of sufficiently large adverse freestream pressure gradients, it is shown that a novel three-dimensional breakdown of the vortex system is possible at a finite downstream location, linked to the onset of streamwise flow reversal, and this is fully analysed. Third, the stability of the developing flow is considered, using short-wavelength stability analysis. The asymptotic analysis is self consistent throughout.

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