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Investigation of the critical strain rate for co-rotating vortex pairs
PATRICK FOLZ, KEIKO NOMURA, University of California, San Diego — Two-dimensional interactions of a co-rotating vortex pair in a viscous fluid are investigated. With symmetric vortex pairs, i.e. those with two vortices of equal size and strength (Brandt & Nomura, *J. Fluid Mech.*, vol. 592, 2007), the mutually-induced strain deforms and tilts the vortices, which leads to a core detrainment process. The weakened vortices are mutually entrained and rapidly move towards each other as they intertwine and destruct, thereby developing into a single compound vortex. With asymmetric pairs, the interactions are more complex and may result in different outcomes. These can be classified according to the relative timing of core detrainment and core destruction of the vortices. A critical strain rate parameter which characterizes the establishment of core detrainment has been identified and determined. In rudimentary studies, this critical value was found to be consistent for a range of vortex strength ratios (Brandt & Nomura, *J. Fluid Mech.*, vol. 646, 2010). In the present study, further analysis and numerical simulations are performed to ascertain the degree of universality of the critical strain rate value. A larger range of flow parameters is considered. Results clarify the relationship between the parameter and the behavior of these vortex flows.

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