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Chaotic advection in unstable two-dimensional circular vortices. ISABEL MALICO, Universidade de Evora, PAULO FERREIRA DE SOUSA, New Mexico State University — Chaotic advection was studied in the formation process of multi-pole vortices that result from unstable monopole circular vortices. The unsteady, incompressible two-dimensional Navier–Stokes equations were solved with fourth-order Runge–Kutta temporal discretization and fourth-order compact schemes for spatial discretization. By examining patterns of the spatial variation of finite-time Lyapunov exponents, it is seen that as the initial perturbation to the flow grows, the resultant flow is dominated by chaotic regions that trap small regions of invariant tori. It is also seen that the regular regions surrounding the chaotic bands are the main barriers to the transport identified during the multi-pole formation. Lagrangian Coherent Structures (LCS) are also employed in this study, and their evolution is compared with the patterns of finite-time Lyapunov exponents.

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