

Abstract Submitted
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Chaotic scattering of two vortex pairs¹ LAUST TOPHØJ, Department of Physics, Technical University of Denmark, HASSAN AREF², Center for Fluid Dynamics, Technical University of Denmark — Chaotic scattering of two vortex pairs with slightly different circulations was considered by Eckhardt & Aref in 1988. A new numerical exploration suggests that the motion of two vortex pairs, with constituent vortices all of the same absolute circulation, also displays chaotic scattering regimes. The mechanisms leading to chaotic scattering are different from the “slingshot effect” identified by Price [*Phys. Fluids A*, **5**, 2479 (1993)] and occur in a different region of the four-vortex phase space. They may in many cases be understood by appealing to the solutions of the three-vortex problem obtained by merging two like-signed vortices into one of twice the strength, and by assuming that the four-vortex problem has unstable, periodic solutions similar to those seen in the thereby associated three-vortex problems. The integrals of motion, linear impulse and Hamiltonian, are recast in a form appropriate for vortex pair scattering interactions that provides constraints on the parameters characterizing the outgoing vortex pairs in terms of the initial conditions.

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²Permanent address: ESM Dept., Virginia Tech, USA

Hassan Aref
Virginia Tech

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