

Abstract Submitted
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Partial reconnection of orthogonal vortices¹ LOUIS DUFRESNE, ETS, U. Quebec, Canada, GUILLAUME BEARDSELL, GUY DUMAS, U. Laval, Canada — In this work, we use DNS to study the reconnection of two orthogonal vortices following the approach of Boratav et al. (1992). For equal circulation vortices we observe the classical reconnection process (Hussain & Duraisamy, 2011). Our main interest though is on the interaction of unequal strength vortices for which only partial reconnection can occur. Typically in these latter cases, the weak vortex (Γ_2) is seen to deform and wrap itself around the strong one (Γ_1) to (partially) reconnect in an anti-parallel configuration similar to what is observed in Marshall et al. (2001). Each branch of the broken weak vortex then forms a spiral structure around the main one; the weaker the vortex, the stronger the spiral. This results in two “circulation jumps” on the main vortex that propagate away from each other, leaving behind them an altered main vortex with reduced circulation. For Reynolds numbers (Γ_1/ν) in the order of 10^3 and circulation ratios $0.1 \leq \Gamma_2/\Gamma_1 \leq 0.9$, we look at the internal structure of the main vortex with a particular attention to the propagating vorticity structures. These structures are very similar to what has been previously observed in the evolution of four-vortex systems (Dufresne & Winkelmann, 2005).

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