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Evolution of Vortex Pairs Subject to the Crow Instability in Wall Effect[1] DANIEL ASSELIN, C.H.K. WILLIAMSON, Cornell University — In this research, we examine the effect of a solid boundary on the dynamics and instabilities of a pair of counter-rotating vortices. An isolated vortex pair is subject to both a short-wave elliptic instability and a long-wave Crow (1970) instability. Near a wall, the boundary layer that forms between the primary vortices and the wall can separate, leading to the generation of secondary vorticity. In the present study, we are examining the long-wave Crow instability as it is modified by interaction with a wall. The regions of the perturbed vortex pair which first interact with the wall experience accelerated circulation decay, which leads to the formation of an axial pressure gradient. This pressure difference produces strong axial flows, which ultimately give rise to interactions between the primary and secondary vortices and the generation of small-scale vortex rings. These rings vary in number and orientation depending on the extent to which the Crow instability has developed prior to interaction with the wall. In addition to the topological modifications, significant changes to the vortex dynamics, including circulation and core size, are also observed during and after interaction with the boundary.

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