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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. Several key features of the flow are observed. Strong axial flows cause fluid containing vorticity to move from the "troughs" of the initially wavy vortex tube to the "peaks." This process is associated with distinct differences in vortex concentration at the peak and the trough, which lead to the establishment of an axial pressure gradient. Furthermore, the primary and secondary vortices interact to form additional small-scale vortex rings. The exact number and orientation of these small-scale rings is highly dependent on the extent to which the Crow instability has developed prior to interaction with the ground. Finally, significant changes to the vortex dynamics, including circulation, core size, and topology, are also observed during and after interaction with the boundary.

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