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On the Anti-Symmetric Modes of Crow Instability by a General Instability Analysis Method ZHONGQUAN CHARLIE ZHENG, University of Kansas, JAY HARDIN, NASA Langley Research Center (Retired) — The sinusoidal instability of a counter-rotation vortex pair has been investigated in Crow's seminal work (Crow, 1970). The anti-symmetric modes of instability were considered weak interaction modes by Crow, although they are the most amplified modes, according to Fig.11 in his paper. The weak interaction instability modes are those disturbances that are near the zero-self-induction and in the high wave-number range. However, later Saffman (1992) stated that all the anti-symmetric modes were stable. In this paper, the disturbance matrix is investigated. By looking at the eigenvalues and eigenvectors of the growth matrix, the symmetric and anti-symmetric modes of Crow's instability are recovered. Furthermore, by using a general instability analysis method of Farrell and Ioannou (1996), the upper bounds of the instability can be obtained, which again proves that the anti-symmetric modes are more amplified. These anti-symmetric modes can occur in both the long-wave modes and short-wave modes.

Zhongquan Charlie Zheng
University of Kansas

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