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Stability of inviscid vortices behind a circular cylinder ALAN ELCRAT, Wichita State University, BENGT FORNBERG, University of Colorado, KEN MILLER, Wichita State University — In a previous work (JFM 409(2000), 13-27 famillies of vortex patches in equilibrium with flow past a circular cylinder which is uniform at infinity were found using iterations for a nonlinear Poisson equation. These included desingularizations of the Foppl pairs. In this work we study the stability of these vortices with respect to two dimensional perturbations. In order to do this we have formulated a curve perturbation algorithm, based on the ideas of contour dynamics, which sets the normal component of velocity at a point on the boundary of the vortex patch equal to zero. The discretization is solved by a version of Newton's method; the Jacobean is factored using the singular value decomposition and a generalized inverse with the smallest singular value removed is used in the Newton iteration. This is necessary because there is always a small singular value due to the fact that there is always a nearby solution vortex in the familly. The Foppl familly is always neutrally stable with respect to symmetric perturbations in nthe sense that all of the eigenvalues are on the imaginary axis. When non symmetric perturbations are allowed there is exactly one unstable mode. A perturbation in the direction of this eigenvector implies a roll suggestive of Karman vortex shedding.

Alan Elcrat
Wichita State University

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