Linear stability of relative equilibria of identical point vortices[1]
HASSAN AREF[2], Technical University of Denmark, Lyngby, Denmark — The linear stability analysis of relative equilibria of N identical point vortices is reconsidered. First, we show that the problem can be reduced to evaluating the eigenvalues and eigenvectors of a certain Hermitean matrix. Then, the exact solution of the linear stability problem for the collinear relative equilibria is given following work by Calogero and Bruschi from the late 1970's. We consider the possibility of extending these largely algebraic results to general configurations, and we explore the class of relative equilibria for which such calculations may be carried through. The regular polygons certainly fall in this class, but the known families of nested, regular polygons may also allow at least a partial analytical stability analysis. The role of the generating polynomial in stability calculations is explored, and also the link between stability of a relative equilibrium and the existence of an axis of symmetry of the configuration. Such a link was suggested to the author by D. L. Vainchtein several years ago.

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