Abstract Submitted
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**Effect of an axial flow on three-dimensional instabilities in Stuart vortices**[1] MANIKANDAN MATHUR, Department of Aerospace Engineering, IIT Madras, Chennai, India, SABINE ORTIZ, LadHyX, Ecole Polytechnique, Palaiseau, France, THOMAS DUBOS, Laboratoire Meteorologie Dynamique, Ecole Polytechnique, Palaiseau, France, JEAN-MARC CHOMAZ, LadHyX, Ecole Polytechnique, Palaiseau, France — In this talk, we present a stability analysis of the Stuart vortices in the presence of an axial flow by numerically solving the local stability equations derived by Lifschitz & Haimeri (1991). Deriving the criteria for wave vectors to be periodic upon their evolution around flow trajectories that are periodic in a plane perpendicular to the axial direction, we integrate the amplitude equations around periodic trajectories for periodic wave vectors. The elliptic and hyperbolic instabilites, which are present without the axial velocity, disappear beyond a threshold value for the axial velocity strength. Furthermore, a threshold axial velocity strength, above which a new centrifugal instability branch is present, is identified. A heuristic novel criterion, which reduces to the Leibovich & Stewartson (1983) criterion in the limit of an axisymmetric vortex, for centrifugal instability in a non-axisymmetric vortex with an axial flow is then proposed and validated.

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