

Abstract Submitted
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Non-parallel spatial stability of Batchelor vortex¹ CARLOS DEL PINO, LUIS PARRAS, RAMON FERNANDEZ-FERIA, University of Malaga (Spain) — We analyze the spatial stability of the so-called Batchelor vortex taking into account the non-parallel effects associated to the axial variation of this self-similar vortex. To that end we integrate the Parabolized Stability Equations (PSE) along the axis of the vortex starting from the local “parallel” stability results (eigenvalues and eigenfunctions) at a given axial location. We first compare these initial eigenvalues with those obtained at the same conditions from the parallel version of the Batchelor vortex, sometimes also called q -vortex, which is the standard version of the Batchelor vortex used in previous stability analysis, and find that they differ substantially. The differences are shown to be due to a term in the self-similar solution which is neglected in the q -vortex version. This term becomes increasingly important as the swirl parameter q grows. Then we fully characterize the non-parallel stability properties of Batchelor vortex along the axis for several cases of interest in trailing vortices, particularly in the far wake behind large commercial aircrafts.

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