

Abstract Submitted
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Global stability analysis of axisymmetric boundary layers

RAMESHKUMAR BHORANIYA, VINOD NARAYANAN, Mechanical Engineering, Indian Institute of Technology, Gandhinagar, India — Global stability analysis of the axisymmetric boundary layer flow explores the stability features of a nonparallel flow. Consider an incompressible flow past a cylinder, where flow direction is parallel to the axis of cylinder. The ensuing boundary layer is axisymmetric but non-similar. Due to the boundary layer growth, the velocity profile is two dimensional. This work aims to understand the nonparallel effects of an axisymmetric boundary layer using a biglobal stability analysis. The linearized biglobal stability equations are derived in polar cylindrical coordinates. The resulting stability equations along with boundary conditions form an eigenvalue problem, which is solved using Chebyshev spectral collocation method. Arnoldi's algorithm is used to compute selective eigenvalues and eigenfunctions. The results show that the nonparallel effects are considerable at very moderate Reynolds numbers. More detailed results will be presented at the time of conference.

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