

Abstract Submitted
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Effect of viscosity stratification on stability of axisymmetric boundary layer NIRMAL JAYAPRASAD, VINOD NARAYANAN, IIT Gandhinagar — Stability analysis of heated axisymmetric boundary layers explores the stability characteristics of different types of fluids flowing over a heated cylindrical body. In this work, an incompressible, laminar flow over a heated and cooled cylinder, where the flow direction is parallel to the axis of cylinder at steady state is numerically simulated by solving the coupled Navier Stoke's equation and energy equation in cylindrical coordinates. Parallel flow assumption is used to obtain the stability equations. The viscosity variation with temperature is incorporated by using an empirical relation. Since air and water show opposite trend of viscosity variation with temperature, these fluids are considered. The analysis is performed for a range of Reynolds numbers and different wave numbers. The results show that heating stabilizes the flow of water but it has a destabilizing effect on air flow. The effect of Peclet number on the stability characteristics of the flow is also studied. Neutral stability curves of axisymmetric flow of air and water for various temperatures of the cylindrical body are also computed. More detailed results will be presented at the time of conference.

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