

Abstract Submitted
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Transient growth in Core-Annular Flow GENNARO COPPOLA, DETEC, University of Naples Federico II, ANNAGRAZIA ORAZZO, LUIGI DE LUCA, DIAS, University of Naples Federico II — The classical problem of the stability of Core-Annular Flow (CAF) in pipes is here reconsidered from the point of view of linear non modal analysis. An accurate Chebyshev pseudospectral code in polar coordinates has been developed in order to separately discretize the two phases of the flow. The classical tools of non modal analysis have been employed in order to assess the effects of non normality on transient evolution of small perturbations to core-annular base flow. Linear transient growths of three dimensional perturbations are computed for typical potentially stable configurations, by taking into account the effects of viscosity and volume ratios between the two liquids, as well as of Reynolds number and surface tension. A detailed numerical investigation has been conducted on wide regions of the parameters space and the occurrence of substantial transient growth has been found for asymptotical stable configurations. Optimal perturbations for the most critical parameters have been determined and their structure during the unsteady evolution has been considered. It is found that in situations in which axisymmetric modes of disturbance are expected to constitute the most dangerous ones, in subcritical conditions spiral disturbances can provide higher levels of energy amplification.

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