

Abstract Submitted
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Role of the recirculation region in the transition of a laminar separation bubble O RAMESH, SOURABH DIWAN, Indian Institute of Science — The role of the recirculating region in the transition of a laminar separation bubble is explored in this work. The primary instability of a separation is convective and this inflexional mode is active along the mean inflection point locus located outside the mean dividing streamline. The region inside the dividing streamline and close to the wall – called the wall mode- however is seen to display a small region of negative production of turbulent kinetic energy. This has an interesting stabilizing role on the bubble dynamics. The negative production region is seen to increase in extent with increased values of maximum reversed flow velocity of the bubble. This is shown by doing a linear stability analysis of a mean velocity distribution of a model separation bubble. This negative production region is shown to have two important implications for the separation bubble: (a) The upper branch dynamics of the neutral stability curve is significantly affected by the negative production (b) while there is onset of absolute instability in the bubble with increased values of maximum reversed flow, it is seen that relatively higher values of reversed flow required for this onset are necessitated by the presence of the negative production region.

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