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Large eddy simulation of buoyancy induced asymmetry in horizontal jets NIRANJAN GHAISAS, STEVEN FRANKEL, School of Mechanical Engineering, Purdue University — Horizontal injection of a heavier fluid into a lighter ambient leads to a horizontal buoyant jet. This configuration is marked by the simultaneous presence of stable stratification above the jet centerline, and unstable stratification below it. This leads to unequal rates of turbulent mixing and an asymmetric development of the jet above and below the centerline. This asymmetry between the stably stratified and unstably stratified regions in the horizontal jet is investigated using large eddy simulations in this study. Parameters such as radial half-widths and measures of anisotropy are investigated. Differences in the structures occurring in stable and unstable stratifications are pointed out. Finally, a dynamic mode decomposition analysis is performed with the stably stratified and unstably stratified regions considered together, as well as individually. It is seen that the unstably stratified region is more energetic, and prone to instabilities, as compared to the stably stratified region.

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