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Turbulence characteristics in the variable-density Rayleigh-Taylor mixing layer DANIEL LIVESCU, MARK PETERSEN, ROB GORE, Los Alamos National Laboratory — The turbulence generated in the Rayleigh-Taylor mixing layer is studied using data from Direct Numerical Simulations on up to 4096^3 meshes. The simulations cover the range of Atwood numbers $A = 0.04 - 0.9$ in order to study small departures from the Boussinesq approximation as well as large Atwood number effects. The results show that, although the layer width becomes self-similar relatively fast, the lower order terms in the self-similar expressions for turbulence moments have long-lasting effects and derived quantities, such as the turbulent Reynolds number, are slow to follow the self-similar predictions. This has important consequences for moment closures, which generally assume full, asymptotic self-similarity. The results also show that at large Atwood numbers, the turbulence structure changes qualitatively and various turbulence moments become asymmetric. These asymmetries, together with that of the mixing itself, have a profound influence on the shape of the mixing layer.

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