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Statistics of High Atwood Number Turbulent Mixing Layers JON BALTZER, DANIEL LIVESCU, Los Alamos National Laboratory — The statistical properties of incompressible shear-driven planar mixing layers between two miscible streams of fluids with different densities are investigated by means of Direct Numerical Simulations. The simulations begin from a thin interface perturbed by a thin broadband random disturbance, and the mixing layers are allowed to develop to self-similar states. The temporal simulations are performed in unprecedented domain sizes, with grid sizes up to 6144 x 2048 x 1536, which allows turbulent structures to grow and merge naturally. This allows the flow to reach states far-removed from the initial disturbances, thereby enabling high-quality statistics to be obtained for higher moments, pdfs, and other quantities critical to developing closure models. A wide range of Atwood numbers are explored, ranging from nearly constant density to At=0.87. The consequences of increasing the density contrast are investigated for global quantities, such as growth rates, and asymmetries that form in statistical profiles. Additional simulations in smaller domains are performed to study the effects of domain size.

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