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**Reynolds and Atwood Numbers Effects on Homogeneous Rayleigh Taylor Instability**[1] DENIS ASLANGIL, Lehigh University, DANIEL LIVESCU, Los Alamos National Laboratory, ARINDAM BANERJEE, Lehigh University — The effects of Reynolds and Atwood numbers on turbulent mixing of a heterogeneous mixture of two incompressible, miscible fluids with different densities are investigated by using high-resolution Direct Numerical Simulations (DNS). The flow occurs in a triply periodic 3D domain, with the two fluids initially segregated in random patches, and turbulence is generated in response to buoyancy. In turn, stirring produced by turbulence breaks down the scalar structures, accelerating the molecular mixing. Statistically homogeneous variable-density (VD) mixing, with density variations due to compositional changes, is a basic mixing problem and aims to mimic the core of the mixing layer of acceleration driven Rayleigh Taylor Instability (RTI). We present results covering a large range of kinematic viscosity values for density contrasts including small (A=0.04), moderate (A=0.5), and high (A=0.75 and 0.9) Atwood numbers. Particular interest will be given to the structure of the turbulence and mixing process, including the alignment between various turbulence and scalar quantities, as well as providing fidelity data for verification and validation of mix models.

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