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Direct numerical simulation of a small Atwood number Rayleigh-Taylor instability-driven mixing layer NICHOLAS MUESCHKE, Texas A&M University, OLEG SCHILLING, University of California, Lawrence Livermore National Laboratory, MALCOLM ANDREWS, Texas A&M University — A direct numerical simulation (DNS) of a small Atwood number Rayleigh-Taylor mixing layer was performed using a spectral/compact-difference scheme. The initial conditions were parameterized from interfacial and velocity perturbations measured from water channel experiments at Texas A&M University. Turbulence and mixing statistics, as well as energy spectra, obtained from experimental measurements are compared with those from the DNS to validate the use of experimental measurements as computational initial conditions. The experimental and numerical data are used to examine the transitional dynamics of the mixing layer. The DNS results indicate that initial conditions including both interfacial and velocity perturbations are required to accurately simulate the flow. This research was sponsored by the U.S. DOE National Nuclear Security Administration under the Stewardship Science Academic Alliances program through DOE Research Grant #DE-FG03- 02NA00060. This work was also performed under the auspices of the U.S. Department of Energy by the University of California, Lawrence Livermore National Laboratory under Contract No. W- 7405-Eng-48. UCRL-ABS-214352.

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