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Analysis of gradient-diffusion modeling of Rayleigh-Taylor and Richtmyer-Meshkov instability-induced mixing OLEG SCHILLING, Lawrence Livermore National Laboratory, NICHOLAS MUESCHKE, Texas A&M University, MARCO LATINI, California Institute of Technology, WAI SUN DON, Brown University, MALCOLM ANDREWS, Los Alamos National Laboratory — Gradient-diffusion models of turbulent transport in Rayleigh- Taylor and Richtmyer-Meshkov instability-induced mixing are assessed using direct numerical simulation (DNS) and implicit large-eddy simulation (ILES) data. Mean and fluctuating fields, defined from spatial averages over the periodic directions of the DNS, are used to construct the unclosed terms in the turbulent kinetic energy transport equation. These terms are then compared a priori with the corresponding terms modeled using the gradient-diffusion approximation to assess the validity of this approximation for these buoyancy- and shock- driven flows. Implications for two-equation turbulence modeling of Rayleigh-Taylor and Richtmyer-Meshkov instability-induced mixing are discussed. This work was 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. This research was also sponsored by the National Nuclear Security Administration under the Stewardship Science Academic Alliances Program through DOE Research Grant No. DE-FG03- 02NA00060. UCRL-ABS-223369

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