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Modeling Reaction Rates in Variable-Density Turbulent Mixing NICHOLAS DENISSEN, RAYMOND RISTORCELLI, Los Alamos National Laboratory — Modeling reactions in variable-density turbulent mixing is important for multi-physics applications such as Inertial Confinement Fusion (ICF). Reynolds–Averaged Navier–Stokes (RANS) models are an important tool in this research, and work is ongoing to improve their fidelity in complex flows. Connecting these models to the underlying multi-material mixing and thermonuclear reaction rates is essential. This talk describes the BHR family of turbulence models developed at Los Alamos National Laboratory (LANL), and the information they provide for characterizing turbulent mixing. Some exact relationships for reaction rates in variable-density turbulence will be presented and connected to the lower-order moments provided by variable-density RANS models. These provide model equations for initially pre-mixed and initially separated reactants. The strengths and limitations will be discussed, and examples will be shown from ICF-like hydrodynamic simulations in the LANL ASC code FLAG to assess the impact of these models.

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