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A New Turbulence Model for Capturing Physics in Variable-Density Flows KRISTA STALSBERG-ZARLING, ROBERT GORE, RICK RAUENZAHN, Los Alamos National Laboratory — Variable-density flows are ubiquitous in nature. They are encountered on a larger scale in astrophysical, geophysical, atmospheric and oceanic flows, as well as on a smaller level, for example, in inertial confinement fusion and engine combustion. Our goal was to develop a turbulence model that is universally applicable across a wide variety of variable-density configurations by including more of the physics important to these types of flows. As part of this effort, the BHR turbulence model, which we use to close the traditional RANS equations, has been extended to capture the effects of molecular mixing in miscible fluids, as well as changes in turbulence quantities that occur due to demixing. Here, we demonstrate these new model capabilities for a flow that evolves from an unstable to stable Rayleigh-Taylor state. The model results are validated against experimental data.

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