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Modeling Variable-Density Jets with Co-Flow Using BHR DANIEL ISRAEL, Los Alamos National Laboratory — The two-fluid jet in a co-flow has two similarity breaking features which make it more interesting, and challenging, than the simple self-similar jet. First, it transitions from strong jet to weak jet, and second, from shear driven to buoyancy driven. These two simultaneous mechanisms make it a strong test for a turbulence model. The Extreme Fluids team at Los Alamos National Laboratory has an on-going experimental campaign examining an SF_6 jet injected downwards into a co-flowing air stream. Using simultaneous PIV/PLIF they have obtained measurements of important turbulence quantities, including the Reynolds stresses, and the velocity-density correlations. In the current work, these measurements are used to validate the BHR turbulence model. The BHR model (Besnard et al., 1992) is a variable-density turbulence model similar to the LRR model for shear flows, but with additional transport equations for $\bar{\rho} a_i = \overline{\rho' u_i''}$ and $b = \overline{\rho' v'}$. Here we examine both the conventional model form, as well as a new version (Schwarzkopf et al., 2016) which include two length-scale equations: one for the dissipation scale, and one for the turbulent transport scale.

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