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Two-point spectral model for variable density homogeneous turbulence[1] NAIRITA PAL, Applied Mathematics and Plasma Physics, T-5, Theoretical Division, and Center for Nonlinear Studies, Los Alamos National Laboratory, NM 87545, USA, SUSAN KURIEN, Applied Mathematics and Plasma Physics, T-5, Theoretical Division, Los Alamos National Laboratory, NM 87545, USA, TIMOTHY CLARK, Department of Mechanical Engineering, University of New Mexico, Albuquerque, NM 87131, USA, DENIS ASLANGIL, Department of Mechanical Engineering and Mechanics, Lehigh University, Bethlehem, Pennsylvania 18015, USA, DANIEL LIVESCU, CCS-2, Los Alamos National Laboratory, Los Alamos, New Mexico 87545, USA — We present a comparison between a two-point spectral closure model for buoyancy-driven variable density homogeneous turbulence, with Direct Numerical Simulation (DNS) data of the same system. We wish to understand how well a suitable spectral model might capture variable density effects and the transition to turbulence from an initially quiescent state. Following the BHRZ model developed by Besnard et. al (1990), the spectral model calculation computes the time evolution of two-point correlations of the density fluctuations with the momentum and the specific-volume. These spatial correlations are expressed as function of wavenumber k and denoted by $\mathbf{a}(k)$ and $b(k)$, quantifying mass flux and turbulent mixing respectively. We assess the accuracy of the model, relative to a full DNS of the complete hydrodynamical equations, using $\mathbf{a}$ and b as metrics.

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