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Compressible Explicitly Filtered Large-Eddy Simulation Subgrid-Scale Models Based on the Poor Man's Navier–Stokes Equations J.M. MCDONOUGH, J.P. STRODTBECK, University of Kentucky — A single-parameter large-eddy simulation (LES) method for compressible flows that combines explicit filtering with a chaotic backscatter term based on the compressible "poor man's" Navier–Stokes (PMNS) equation (Strodtbeck *et al., Int. J. Bifur. and Chaos*, 2012) is presented and compared to direct numerical simulation (DNS) of homogeneous, isotropic, decaying turbulence in a periodic cube with a turbulent Mach number of 0.3 and Taylor micro-scale Reynolds number of 72. The DNS employed a 129^3 mesh, and LES was run on a 65^3 mesh. The backscatter is created by utilizing output from the PMNS equations as a multiplier on the high-pass filtered momentum to induce mixing, then using the results in a single-parameter linear forcing term that is simply added to the solution procedure. It is demonstrated that with a judicious choice of model parameter, the backscatter model is capable of enhancing small-scale turbulent flow structures and improving the flow statistics and spectral characteristics of the LES solution to more closely match the DNS results.

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