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LES Scale Enrichment and its Effect on the Pressure Field[1] RYAN HASS, Stanford University, Stanford, CA 94305, ADITYA GHATE, NASA Ames Research Center, Moffett Field, CA 94035, SANJIVA LELE, Stanford University, Stanford, CA 94305 — High Reynolds number flows, common in engineering applications, limit the bandwidth of scales available to modern computers when solving the full nonlinear governing equations. This unavailable information is often crucial to design of aerospace systems or wind turbine blades for example. Ghate & Lele (JFM, v. 819, 2017) have developed a method to enrich turbulence scales below the implied filter width of LES in such a way that local information of subgrid-scale dynamics is accurately represented through the use of spatially- and spectrally-localized Gabor modes. The method relies on a quasi-homogeneous assumption and expands the sub-grid velocity field as a local sum over Gabor modes which evolves dynamically with the large-scale field. We have extended the investigation of the methods ability to enrich subgrid scales, in the context of stationary homogeneous isotropic turbulence, to its effect on the pressure field where a 32^3 LES is enriched and compared to an independent 256^3 LES benchmark case in the infinite Reynolds number limit. This study shows close agreement of the enriched field and its high-resolution counterpart in terms of pressure spectrum, pressure variance, pressure gradient variance, and the space-time correlation of both pressure and pressure gradient.

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