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Assessment of the t-model as a SGS model for LES of high-Re turbulent flows ABHILASH CHANDY, Department of Mechanical Engineering, University of Akron, Akron, OH, STEVEN FRANKEL, School of Mechanical Engineering, Purdue University, West Lafeyette, IN — The recently developed optimal prediction-based t-model (PNAS, 2007) is quantitatively assessed as a SGS turbulence model for LES of decaying homogeneous turbulence (DHT) and transition to turbulence for the Taylor-Green vortex (TGV) through comparisons to laboratory measurements and DNS. The t-model is based on the idea the motion of a vortex at one scale is influenced by the past history of motion of vortices in other scales ("long memory" effects). t-model predictions are compared to the classic non-dynamic Smagorinsky model. Regarding the t-model, this work represents its first application to decaying turbulence with comparison to active-grid-generated decaying turbulence measurements of Kang *et al.* (J. Fluid Mech., 2003) at $Re_\lambda \approx 720$ and $Re = 3000$ DNS of transition to turbulence in the TGV of Drikakis *et al.* (J. Turb., 2007). For DHT non-dynamic Smagorinsky is in excellent agreement with measurements for t.k.e. but higher-order moments show slight discrepancies and for TGV, energy decay rates agree reasonably well with DNS. Regarding the t-model, predictions are worse than Smagorinsky at the same grid resolution due to the insufficient resolution of small scales. Improved results are obtained at higher resolutions, but are still not as good as Smagorinsky.

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