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Assessment of SGS models in an $Re_\tau = 2000$ channel flow[1] SANJEEB BOSE, PARVIZ MOIN, Center for Turbulence Research, Stanford University — Typical validation of subgrid scale models for large-eddy simulation are performed at a relatively low Reynolds numbers and at reasonably fine resolutions. We assess the performance of subgrid scale models for large-eddy simulation at a high Reynolds number. Explicitly filtered large-eddy simulations of a fixed pressure gradient driven $Re_\tau = 2000$ channel flow are performed using the dynamic Smagorinsky, dynamic Vreman (You & Moin, 2007; Vreman, 2004), and a dynamic eddy viscosity model with $\nu_t = Ck_{sgs}|\bar{S}|^{-1}$. The resolution of LES simulations is chosen to be quite coarse ($\Delta x_f^+ \approx 155$, $\Delta z_f^+ \approx 78$) in order to highlight the deficiencies of the subgrid scale models. Mean velocity profiles, rms fluctuations, and one dimensional energy spectra are compared with both filtered DNS and unfiltered DNS (Hoyas & Jimenez, 2006). The $k_{sgs}|\bar{S}|^{-1}$ model most accurately predicts the mean velocity profile, predicts the mass flux within 1.5%, and the centerline velocity within 3%. The effect of using a global coefficient for the eddy viscosity model versus a wall normal varying model coefficient will also be discussed.

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