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A New Mixed Nonlinear LES Models for Boundary Layers

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It is shown for plane channel flow that a new mixed nonlinear/eddy viscosity model reproduces the mean profile of a benchmark dynamic LES and DNS. Profiles of the components of kinetic energy have the same shape as in the DNS, but the magnitudes differ by between 25% and 50%. There are three components to the model. URANS for k_T with a damping function in the viscous sublayer, an eddy viscosity based upon k_T, and filtered nonlinear terms imposed on the grid scale that are based upon the Leray regularization. Coefficients were determined by theoretical considerations of the energy cascade and discretization on the grid-scale, then checked by comparing to isotropic decaying turbulence,

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