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Reynolds Stress Anisotropy Effects on the Modeling of Production in Compressible Homogeneous Turbulent Shear Flow JOHN PANICKACHERIL, GREGORY BLAISDELL, Purdue University — Direct numerical simulations of compressible homogeneous shear flow are performed for a range of gradient Mach numbers and time scale ratios. A pseudo-spectral Fourier collocation method is used to perform the simulations. Compressibility effects associated with larger gradient Mach numbers result in increased anisotropy of the Reynolds stresses and a reduced growth rate of turbulent kinetic energy. However, the time scale ratio also affects Reynolds stress anisotropy. The DNS results seem to indicate that the model coefficient C_μ in the production term of the turbulent kinetic energy equation is mainly dependent on the time scale ratio for low gradient Mach numbers and collapses to a single function of gradient Mach number for higher gradient Mach numbers. A model for C_μ is formulated based on this behavior in the DNS. Computations using this model are then compared to the DNS results.

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