Abstract Submitted
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Energy based hybrid turbulence modeling SIGFRIED HAERING, ROBERT MOSER, University of Texas at Austin — Traditional hybrid approaches exhibit deficiencies when used for fluctuating smooth-wall separation and reattachment necessitating ad-hoc delaying functions and model tuning making them no longer useful as a predictive tool. Additionally, complex geometries and flows often require high cell aspect-ratios and large grid gradients as a compromise between resolution and cost. Such transitions and inconsistencies in resolution detrimentally effect the fidelity of the simulation. We present the continued development of a new hybrid RANS/LES modeling approach specifically developed to address these challenges. In general, modeled turbulence is returned to resolved scales by reduced or negative model viscosity until a balance between theoretical and actual modeled turbulent kinetic energy is attained provided the available resolution. Anisotropy in the grid and resolved field are directly integrated into this balance. A viscosity-based correction is proposed to account for resolution inhomogeneities. Both the hybrid framework and resolution gradient corrections are energy conserving through an exchange of resolved and modeled turbulence.

Sigfried Haering
University of Texas at Austin

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