Hybrid LES/RANS simulation of a turbulent boundary layer over a rectangular cavity[1] QI ZHANG, SIGFRIED HAERING, TODD OLIVER, ROBERT MOSER, University of Texas at Austin — We report numerical investigations of a turbulent boundary layer over a rectangular cavity using a new hybrid RANS/LES model [1] and the traditional Detached Eddy Simulation (DES). Our new hybrid method aims to address many of the shortcomings from the traditional DES. In the new method, RANS/LES blending controlled by a parameter that measures the ratio of the modeled subgrid kinetic energy to an estimate of the subgrid energy based on the resolved scales. The result is a hybrid method automatically resolves as much turbulence as can be supported by the grid and transitions appropriately from RANS to LES without the need for ad hoc delaying functions that are often required for DES. Further, the new model is designed to improve upon DES by accounting for the effects of grid anisotropy and inhomogeneity in the LES region. We present comparisons of the flow features inside the cavity and the pressure time history and spectra as computed using the new hybrid model and DES.

[1] [1] S. Haering. Anisotropic hybrid turbulence modeling with specific application to the simulation of pulse-actuated dynamic stall control. PhD thesis, University of Texas at Austin, 2015.

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