Abstract Submitted
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A numerical method for DNS/LES of high–enthalpy turbulent flows SHANKAR GHOSH, KRISHNAN MAHESH, University of Minnesota — A numerical method is developed for simulation of high– enthalpy turbulent flows. A non-dissipative algorithm is used for accurate flux reconstruction at the cell faces. The method is combined with a predictor corrector based shock capturing scheme to simulate strong shock waves encountered in high– enthalpy flows. A non–linear limiter is used to limit the application of shock capturing only to the vicinity of the shock wave to minimize dissipation. The Navier-Stokes equations are suitably modified to represent various thermo–chemical processes occurring in high–enthalpy flows. A five species model for air is considered. To account for finite rate chemical reactions, individual mass conservation equations are solved for every species. An equation for conservation of vibrational energy is also solved to account for vibrational excitation. Species diffusion is modeled through Fick's law. Transport properties are computed taking high temperature effects into account. The numerical method is evaluated using test problems.

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