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Shock-induced Ignition in 2D Shock Turbulence Interaction XIANGYU GAO[1], IVAN BERMEJO-MORENO, Univ of Southern California, JOHAN LARSSON, University of Maryland — Shock induced ignition in the shock-turbulence interaction (STI) setting is studied with 2D direct numerical simulation (DNS) using finite-rate detailed chemistry. Four reactive STI simulations are conducted with initial Taylor microscale Reynolds number $Re_\lambda = (1250, 600)$ and turbulent Mach number $M_t = (0.1, 0.3)$ in the inflow turbulence at shock Mach number $M = 2$ with oxygen, hydrogen and argon mixture, and compared with laminar simulation at the same Mach number. Compressibility of the upstream turbulence leads to earlier ignition compared with laminar simulation, and the peak values of thermodynamic quantities at the flame front are found to be lower for the turbulent cases under consideration, owing to the partially premixed nature of the mixture. An analysis of the temporal evolution of the flame regime reveals that the reaction happens mostly in the thin reaction zone regime, which is characterized by a broadened preheat zone. Lower M_t brings a slightly higher probability that the combustion happens in the regime of corrugated flamelets. The time evolution of the Takeno Flame Index (TFI) indicates that, as the flame propagates upstream, the combustion becomes increasingly non-premixed because of the larger variance of the species mass fractions.

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