

Abstract Submitted
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Effects of small scale energy injection on large scales in turbulent reaction flows YUAN XUAN, Pennsylvania State University — Turbulence causes the generation of eddies of various length scales. In turbulent non-reacting flows, most of the kinetic energy is contained in large scale turbulent structures and dissipated at small scales. This energy cascade process from large scales to small scales provides the foundation of a lot of turbulence models, especially for Large Eddy Simulations. However, in turbulent reacting flows, chemical energy is converted locally to heat and therefore deploys energy at the smallest scales. As such, effects of small scale energy injection due to combustion on large scale turbulent motion may become important. These effects are investigated in the case of auto-ignition under homogeneous isotropic turbulence. Impact of small scale heat release is examined by comparing various turbulent statistics (e.g. energy spectrum, two-point correlation functions, and structure functions) in the reacting case to the non-reacting case. Emphasis is placed on the identification of the most relevant turbulent quantities in reflecting such small-large scale interactions.

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