

Abstract Submitted
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Premixed autoignition in compressible turbulence¹ ADITYA KONDURI, HEMANTH KOLLA, ALEXANDER KRISMAN, JACQUELINE CHEN, Combustion Research Facility, Sandia National Laboratories — Prediction of chemical ignition delay in an autoignition process is critical in combustion systems like compression ignition engines and gas turbines. Often, ignition delay times measured in simple homogeneous experiments or homogeneous calculations are not representative of actual autoignition processes in complex turbulent flows. This is due the presence of turbulent mixing which results in fluctuations in thermodynamic properties as well as chemical composition. In the present study the effect of fluctuations of thermodynamic variables on the ignition delay is quantified with direct numerical simulations of compressible isotropic turbulence. A premixed syngas-air mixture is used to remove the effects of inhomogeneity in the chemical composition. Preliminary results show a significant spatial variation in the ignition delay time. We analyze the topology of autoignition kernels and identify the influence of extreme events resulting from compressibility and intermittency. The dependence of ignition delay time on Reynolds and turbulent Mach numbers is also quantified.

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