

Abstract Submitted
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Stratification effects on laminar premixed-flame response to mixture perturbations TIERNAN CASEY, JYH-YUAN CHEN, Univ of California - Berkeley — While complete mixing on the molecular level is desirable for ensuring that combustion processes are limited by chemical kinetics rather than mass transport, it is often the case that practical devices operate with some degree of unmixedness. As such, phenomena such as ignition or flame propagation will inevitably occur in regions that exhibit mixture or thermal non-uniformity. Here we present unsteady simulations of laminar premixed flames in the low-Mach limit subject to mixture perturbations of varying wavelength and amplitude, and qualify their effect on the flame behavior. When flames experience variations in mixture the transport processes in the flame zone vary with time and the flame behavior can depend on the burned gas history. Also, the possibility of extending flames beyond their flammability limits so as to maximize the overall mass of fuel burned is explored by exploiting these unsteady effects.

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