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LES of Mild Combustion using Pareto-efficient Combustion Adaptation HAO WU, Stanford University, MICHAEL EVANS, University of Adelaide, MATTHIAS IHME, Stanford University — Moderate or Intense Low-Oxygen Dilution (MILD) combustion is a combustion regime that provides opportunities for improved thermal efficiency and reduced pollutant emissions. In this study, large-eddy simulation is used to investigate the ignition, mixing, and stabilization of a jet flame in this kinetics-controlled combustion regime. The combustion process is modeled by a Pareto-efficient combustion (PEC) formulation that optimally combines reaction-transport and chemistry combustion models. In this approach, a three-stream flamelet/progress variable model is used as a computationally efficient description of equilibrated flame regions, and a finite-rate chemistry representation is employed to accurately represent the ignition behavior and flame stabilization. Through comparisons with experiments and simulations with single-regime combustion models, it will be shown that this Pareto-efficient combustion submodel assignment accurately captures important dynamics in complex turbulent flame configurations.

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