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Characterization of transcritical and supercritical droplet vaporization regimes using computations[1] PAVAN GOVINDARAJU, DANIEL BANUTI, PETER MA, MURALIKRISHNA RAJU, MATTHIAS IHME, Stanford University — Mixing of liquid fuel with ambient gases plays an important role in engine combustion efficiency and emissions. The situation of cold liquid fuel injected into gas at very high pressure and temperature conditions creates special challenges for prediction of combustion characteristics. Among them, the important question is how the interface between cold liquid fuel and hot ambient responds at the pressures and temperatures specific to engines. The presentation will elaborate on the computational procedure used to simulate the injection of n-dodecane into N_2 and comparing interface characteristics with experimental data. This requires robust tools for predicting droplet evaporation, real fluid properties and molecular-dynamic simulations for validating surface tension characteristics. The effect of pyrolysis in the gas phase is considered and the influence of surface tension is examined. Finally, a comparison between theory, experiments and simulations is presented for transition in vaporization regimes.

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