

Abstract Submitted  
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**Large eddy simulation of sprays using the spectral-element method.**<sup>1</sup> JUAN COLMENARES FERNANDEZ, MUHSIN AMEEN, SAUMIL PATEL, Argonne National Laboratory — A novel approach for modeling sprays from high-speed liquid injection is presented here. The liquid phase is modeled stochastically by Lagrangian parcels, while the gas phase is modeled in an Eulerian reference frame using the spectral-element method. The coupling between gas and liquid phase is described. The gas-phase solution is stabilized using a high-pass filter relaxation term, which is suitable for LES using spectral methods and bypasses the need for Smagorinsky-type sub-grid scale models. Sensitivity of the solution to grid resolution, temporal resolution, and spray parameters is analyzed. Simulation results are compared quantitatively and qualitatively against experimental data from the Engine Combustion Network. Some of the challenges and advantages of the current approach for modeling sprays are discussed. The aim of this work is to enable high-fidelity internal combustion engine simulations.

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