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A Numerical Study of the Thermal Transient in High-Pressure Diesel Injection

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**Highlights:**

- High-fidelity simulations of high-pressure Diesel injection are carried out showing the effect of internal injector flow dynamics on spray formation.
- The test cases demonstrate the feasibility of fully compressible two-phase simulations with time-resolved interface capturing.
- The needle opening transient is modeled using realistic geometry description from an industrial injector.
- The effects of injector flow dynamics on the exit fuel temperature are illustrated using a complete equation of state for n-dodecane.
- Grid convergence studies are carried out for rate of mass and momentum and for droplet size distribution.
- Measured rate of mass and momentum and jet penetration data are compared with simulation results
- Differences in spray characteristics resulting from adiabatic and isothermal wall boundary conditions are identified and discussed.

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