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Droplet evaporation and vapor mixing characteristics in a high-speed liquid jet spray JUNJI SHINJO, Japan Aerospace Exploration Agency, AKIRA UMEMURA, Nagoya University — Droplet evaporation and vapor mixing in the early stage of a dense autoigniting spray are studied by detailed numerical simulation. Due to the relative velocity between droplets and air, heat and mass transfer is enhanced around the droplets. In the region of low droplet number density, the behavior is similar to that of a single droplet. In the region of high droplet number density, the interaction between neighboring droplets affects the transfer characteristics. Non-spherical geometry effect of droplets and ligaments will be also studied. The fuel/air mixture is formed non-uniformly due to the non-uniform droplet distribution and flow structure, which are determined during the spray formation. Reaction initiation is strongly affected by this mixture formation. Extension of temporal and spatial scales is finally sought for future effort in applying the results for real-scale combustors.

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