Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Detailed numerical simulation of primary atomization processes of liquid fuel jet JUNJI SHINJO, Japan Aerospace Exploration Agency, AKIRA UMEMURA, Nagoya University — In order to elucidate the physical mechanisms of primary atomization of liquid fuel jet, very detailed numerical simulations have been conducted that resolve all the relevant scales in the primary atomization regime. Three cases of Diesel- like fuel injection into quiescent air with different injection velocities are compared to see the breakup mechanism and the effect of Weber and Reynolds numbers. Surface instability development, ligament creation and droplet formation are observed in the results and characterization of each process has been done. As the injection velocity is increased, the length scale of liquid structure becomes smaller. Ligament formation is observed in the regime of O(1) local Weber number. Droplet formation is governed by the dynamic effect of surface tension waves as expected by our previous study using slow laminar liquid jets. Extension to modeling using these findings will be also discussed.

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Date submitted: 04 Aug 2009 Electronic form version 1.4