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Effect of Nozzle Length/Diameter Ratio on the Breakup of Liquid Jets in Crossflow ANU OSTA, KHALED SALLAM, Oklahoma State University — An experimental research is performed to study the effect of injector geometry (passage length/diameter ratio) on the atomization of liquid jets in crossflow at normal temperature and pressure, large liquid/gas density ratios and small Ohnesorge numbers. Double pulsed shadowgraphy and holographic microscopy was used to observe jet primary breakup for nozzles with different length to diameter ratio which injected into uniform crossflow. Shadowgraphy was used to observe the jet breakup locations and surface waves while digital microscopic holography was used to observe the near surface droplet and ligament distribution. The hologram is captured digitally on a CCD and reconstructed numerically using convolution. Present results show that the breakup length, decreases with increasing nozzle length because of the stronger interaction between the turbulent eddies originating from the boundary layer inside the nozzle and the free surface of the liquid jet. This leads to significantly more atomization and erosion of liquid core. The breakup of turbulent liquid jets was influenced by a new dimensionless number in terms of liquid/gas momentum ratio and jet Weber number.

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