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Hydrodynamic Instabilities in Round Liquid Jets in Gaseous Crossflow BARRY SCHARFMAN, ALEXANDRA TECHET, JOHN BUSH, MIT — Water jets in the presence of uniform perpendicular air crossflow were investigated theoretically and experimentally using high speed imaging for gaseous Weber numbers (We) below 30, small liquid jet Ohnesorge numbers, and large liquid and gaseous Reynolds numbers. Previously, a bag instability has been reported for We between 4 and 30. Jets first deform into curved sheets due to aerodynamic drag, followed by the formation of partial bubbles (bags) along the jet streamwise direction that expand and ultimately burst. Single bags were present at each streamwise position along the liquid jets in prior experiments featuring liquid jet nozzle diameters less than the capillary length of water. We have found that at larger nozzle diameters it is possible to observe multiple bags at the same streamwise jet position because single bags of such large sizes would be unstable. Theoretical predictions for individual bag expansion diameter over time agree with experimental measurements.

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