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The effects of aspect ratio on the flow invariants of droplets in an axisymmetric micro-tube ADAM DEVORIA, KAMRAN MOHSENI, University of Florida — In this study the potential benefits of using a digitized flow (droplets) in place of a continuous flow are investigated. In particular, the aspect ratio (AR) of the droplets is varied and is an important parameter representing how different the droplet flow is from continuous flow. The flow within the droplets is measured with micro digital particle image velocimetry. The measurements are used to compute the flow invariants, namely circulation, hydrodynamic impulse, and kinetic energy in the droplet. It is found that the non-dimensionalized experimental invariants for low-AR droplets are increased above those for a corresponding segment of continuous flow. Also increased are the fluxes of the invariants, as well as the momentum flux. These increases above continuous flow go as the inverse of AR. For jetting applications, the implication is that using a digitized flow can increase the rate of generation of momentum and energy compared to a continuous jet, and furthermore that the droplet AR controls the amount of increase.

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