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Visualization of transverse annular jets PHILIPP BOETTCHER, California Institute of Technology, IOANNIS G. MIKELLIDES, DAVID A. VAUGHAN, NASA-JPL, JOSEPH E. SHEPHARD, JASON DAMAZO, California Institute of Technology — Transverse injection of fluid into an annular jet is a mechanism resulting in good mixing and is therefore utilized in engineering applications such as pintle rocket engines. Vigorous mixing occurs between the two jets. However, much of what we know about the flow behavior of such devices has been learned empirically with very limited studies exploring the fluid dynamics. The geometry under investigation is an axisymmetric radial jet of variable width impinging a fixed annular jet. The main capability of the current facility is to reproduce start-up and quasi-steady flow conditions through the use of a fast acting valve which opens a pressurized reservoir. The flow is then observed using a schlieren system which shows the shock wave from the start-up and the subsequent mixing between the jets. The main parameters under investigation were the reservoir pressure and the area ratio between the axial and radial jet. The effect of these parameters on the qualitative flow behavior is discussed. This effort was carried out in conjunction with modeling efforts at JPL.

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