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Laminar jet injection in a pipe with co-flow JAIME SCHMIEG, MARK STREMLER, PAVLOS VLACHOS, Virginia Tech — Particle Tracking Velocimetry (PTV) was used to investigate confined injection from a generic end-hole catheter within an axial co-flow environment. PTV was carried out in an iterative fashion where an approximate field was calculated from several time instances, and subsequently used as an estimator for hybrid tracking. The influence of momentum ratio on jet expansion, transport, and flow patterns was studied for several velocity ratios (VR = V_{jet}/V_{out}) between 0 and 10. The Reynolds number of the outer flow was 150 and that of the inner flow varied from 0 to 260. Flow patterns behind the catheter were dependent upon VR with recirculation regions present for low ratios. A separation bubble was observed behind the catheter for velocity ratios below 0.5 and two counter-rotating vortices were seen for VR = 0. As VR increased, asymmetry in the outer flow resulted in a single vortex behind the catheter with its position skewed toward the low flow side of the vessel and larger entrainment was present on the high flow side of the vessel. As VR increased above 0.5, recirculation was not observed and at VR = 1.0 the jet velocities were mainly in the streamwise direction.

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