

## Comparative Analysis of Turbulent Plane Jets from a Sharp-Edged Orifice, a Beveled-Edge Orifice and a Radially Contoured Nozzle

**Authors :** Ravinesh C. Deo

**Abstract :** This article investigates through experiments the flow characteristics of plane jets from sharp-edged orifice-plate, beveled-edge and radially contoured nozzle. The first two configurations exhibit saddle-backed velocity profiles while the third shows a top-hat. A vena contracta is found for the jet emanating from orifice at  $x/h = 3$  while the contoured case displays a potential core extending to the range  $x/h = 5$ . A spurt in jet pressure on the centerline supports vena contracta for the orifice-jet. Momentum thicknesses and integral length scales elongate linearly with  $x$  although the growth of the shear-layer and large-scale eddies for the orifice are greater than the contoured case. The near-field spectrum exhibits higher frequency of the primary eddies that concur with enhanced turbulence intensity. Importantly, highly "turbulent" state of the orifice-jet prevails in the far-field where the spectra confirm more energetic secondary eddies associated with greater flapping amplitude of the orifice-jet.

**Keywords :** orifice, beveled-edge-orifice, radially contoured nozzle, plane jets