

Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Vortex dynamics and entrainment mechanisms in lobed jets ILINCA NASTASE, AMINA MESLEM, Universite de La Rochelle — Two isothermal turbulent air jets from lobed nozzles with inclined and respectively non inclined lobes and a circular reference jet with the same initial Reynolds number were experimentally studied. Quantitative image processing of time resolved visualizations as well as hot-wire measurements of the velocity spectra allowed an objective understanding of the vortex roll-up mechanisms. Unlike the circular jet, where the primary rings are continuous, the Kelvin-Helmholtz vortices in the lobed jet flows are discontinuous at the locations where the exit plane curvature turns to infinite. Primary structures detach at different frequencies whether they are shed in the lobe troughs or at the lobe sides. The “cutting” of the Kelvin-Helmholtz vortices enables the development of permanent secondary streamwise structures. Their momentum flux transport role is thus rendered more efficient and seems to be amplified by the double inclination of the injection boundary. The quantification of the entrained flow rates by means of LDA measurements perfectly agrees with these observations.

Ilinca Nastase
Universite de La Rochelle

Date submitted: 06 Aug 2007

Electronic form version 1.4