Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Flow Field of Three-Dimensional Turbulent Wall Jets MARK TACHIE, MARTIN AGELIN-CHAAB, University of Manitoba — A wall jet is formed when a jet of fluid is directed tangentially along a wall. Wall jets can be two- or three-dimensional. Three-dimensional wall jets (3DWJs) are complex flows whose structures are still not well understood despite the extensive studies on this subject. For example, the mechanism responsible for their more rapid lateral spread rate than in the wall-normal spread rate is not well understood. Velocity measurements of 3DWJs were conducted using particle image velocimetry. The 3DWJs were formed by jets exiting a $d = 7$ mm inside diameter circular pipe ($143d$ in length) placed to flush the test section floor. The Reynolds numbers based on the jet exit velocities and jet exit diameters were 5000, 10000 and 20000. The detailed flow fields of the 3DWJs were examined in terms of mean velocities and one-point turbulence statistics. In view of the wide range of length and temporal scales that are present in turbulent flows, multi-point turbulence statistics such as two-point velocity correlations and proper orthogonal decomposition are used to document the salient features of the 3DWJs.

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Date submitted: 10 Aug 2009 Electronic form version 1.4