Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Statistical Features of the Large Scale Coherent Motions in a
Single-Stream Shear Layer (SSSL)\(^1\) JOHN FOSS, KYLE BADE, Michigan
State University — A dedicated PIV flow facility provides uniform seeding in the
primary and the entrainment flows for the subject SSSL. PIV images within the
nominal range: \(500 \leq x/\theta(0) \leq 680\) have been examined by subtracting \(U_o/2\) from each
streamwise component of the measured velocity (in-plane) vectors. The resulting
vector fields exhibited a sparse distribution of clearly defined nodes and saddles in
contrast with the dense population of singular points in the original images. A total
of 917 isolated coherent motions, identified by the topological considerations utilized
in Foss (2004), have been identified in 1000 PIV images. Of these, 538 involved one
node (coherent motion) in the observation window. The population of the areas
that produced the largest spatially averaged vorticity: \(< \omega_z > \Gamma = \Gamma\), and the \(< \omega >\)
values will be presented. 28.6\% of the realizations did not exhibit coherent motions,
9.3\% showed two or more nodes. Other statistical properties of the coherent motions
will be reported. J.F. Foss (2004) “Surface Selections and Topological Constraint
Evaluations for Flow Field Analyses,” Experiments in Fluids, Springer-Verlag, 37,
pp. 883-898.

\(^1\)NSF Grant No. CTS-0352710.

John Foss
Michigan State University

Date submitted: 03 Aug 2007

Electronic form version 1.4