Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Local Flow Topology in Compressible Turbulent Shear Layers
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— The local flow topology is studied using the invariants of the velocity gradient tensor in compressible turbulent mixing layer via direct numerical simulation (DNS). The topological behavior of the flow is analyzed in two different regions: in proximity of the turbulent/non-turbulent interface (TNTI), and inside the turbulent region. The occurrence probability of different flow topologies conditioned by the dilatation level is presented and it is shown that the structures in the locally compressed regions tend to have stable topologies while in locally expanded regions the unstable topologies are prevalent. It is found that the distribution of various flow topologies in regions close to the TNTI differs from inside the turbulent region, and in these regions the most probable topologies are non-focal. At the distances farther than one Taylor microscale from the TNTI, the probability of various topologies is almost constant, and is equal to the values obtained for turbulent region in the mixing layer.

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Date submitted: 31 Jul 2014 Electronic form version 1.4