Abstract Submitted
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Structure functions of passive scalar: evolution in fully 3D shock-driven transition to turbulence[1] PETER VOROBIEFF, DELL OLMSTEAD, DYLAN SIMONS, PATRICK WAYNE, C. RANDALL TRUMAN, University of New Mexico, SANJAY KUMAR, IIT Kanpur — Oblique interaction between a planar shock and a cylindrical density interface results in baroclinic vorticity deposition. The character of the evolving flow is thus different from a similar flow produced by planar normal shock acceleration of the same density interface. In the latter case (planar normal shock), vorticity deposited by the shock is predominantly two-dimensional (directed along the axis of the cylinder), while in the case we consider the shock-induced vorticity field is fully three-dimensional. This results in a complex interplay of vortical structures with different orientations. The statistical properties of the flow are analyzed based on images from two orthogonal visualization planes, using second-order structure functions of the intensity maps of fluorescent tracer pre-mixed with the heavy gas. Scalings consistent with fully developed turbulence are observed at late times. The character of the emergence of these scalings is affected by the flow Mach number, Atwood number, and initial geometry.

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