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Differences in Turbulence Behavior in Two-Dimensional Versus Three-Dimensional Compressions¹ SETH DAVIDOVITS, NATHANIEL FISCH, Princeton University — In the context of inertial fusion experiments, we examine the behavioral differences between turbulent flow compressed in three dimensions (as in typical laser-driven experiments) and turbulent flow compressed in two dimensions (as in Z-pinch experiments). In particular, we derive a quasi “equation-of-state” for the turbulent energy in both cases, and show that a rapid compression in the two-dimensional compression case can preferentially enhance turbulent energy relative to thermal energy, in contrast to the three-dimensional case. Further, we examine the possibilities for viscous dissipation of the turbulence in two-dimensional compressions, and find that complete viscous dissipation of the flow can be more difficult, owing to survival of structure in the non-compressed direction; whether the difficulty is increased is sensitive to the boundary conditions.

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