

Abstract Submitted
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Sudden viscous dissipation in compressing plasma turbulence¹

SETH DAVIDOVITS, Princeton University, NATHANIEL FISCH, Princeton University, Princeton Plasma Physics Laboratory, Princeton, New Jersey 08544, USA — Compression of a turbulent plasma or fluid can cause amplification of the turbulent kinetic energy, if the compression is fast compared to the turnover and viscous dissipation times of the turbulent eddies. The consideration of compressing turbulent flows in inviscid fluids has been motivated by the suggestion that amplification of turbulent kinetic energy occurred on experiments at the Weizmann Institute of Science Z-Pinch.² We demonstrate a sudden viscous dissipation mechanism whereby this amplified turbulent kinetic energy is rapidly converted into thermal energy, which further increases the temperature, feeding back to further enhance the dissipation. Application of this mechanism in compression experiments may be advantageous, if the plasma can be kept comparatively cold during much of the compression, reducing radiation and conduction losses, until the plasma suddenly becomes hot.

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²E. Kroupp et al. PRL **107**, 105001 (2011)

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