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# A model of plasma heating by large-scale flow

In this work, we study the process of energy dissipation triggered by a slow large-scale motion of a magnetized conducting fluid. Our consideration is motivated by the problem of heating the solar corona, which is believed to be governed by fast reconnection events set off by the slow motion of magnetic field lines anchored in the photospheric plasma. To elucidate the physics governing the disruption of the imposed laminar motion and the energy transfer to small scales, we propose a simplified model where the large-scale motion of magnetic field lines is prescribed not at the footpoints but rather imposed volumetrically. As a result, the problem can be treated numerically with an efficient, highly accurate spectral method, allowing us to use a resolution and statistical ensemble exceeding those of the previous work. We find that, even though the large-scale deformations are slow, they eventually lead to reconnection events that drive a turbulent state at smaller scales. The small-scale turbulence displays many of the universal features of field-guided magnetohydrodynamic turbulence like a well-developed inertial range spectrum. Based on these observations, we construct a phenomenological model that gives the scalings of the amplitude of the fluctuations and the energy-dissipation rate as functions of the input parameters. We find good agreement between the numerical results and the predictions of the model.

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