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Identifying the scales of energy transfer due to plasmoid-mediation in 2D MHD turbulence LIANG WANG, Princeton University and Princeton Center for Heliophysics — MHD turbulence plays a critical role in energy transfer in numerous space and astrophysical plasma systems. MHD turbulence tends to form thin electrical current sheets where copious plasmoids could form at sufficiently high magnetic Reynolds numbers and consequently disrupt the current sheets. Recent theoretical and numerical studies have reported a new energy cascade regime in MHD turbulence, mediated by the plasmoid instability and the consequent fast magnetic reconnection. A number of theories predicted that the disruption of current sheet structures would facilitate the energy cascade towards small scales. Later, Dong et al.[1] reported the first direct numerical simulation evidence on this topic in the context of 2D MHD turbulence. In particular, the breaking and steepening of the energy spectrum was confirmed using simulations of unprecedented high resolution and large magnetic Reynolds number (Re=1e6). In this work, we further explore aspects of plasmoid-mediated turbulence using similar large-scale, 2d simulations and quantify the scales at which the plasmoid and reconnection effects set in.
[1] Dong, Wang, Huang, Comisso, Bhattacharjee. Role of the plasmoid instability in magnetohydrodynamic turbulence. Physical review letters. 2018 17;121(16):165101

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