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Physical Regimes of 2D MHD turbulent reconnection in different Lundquist numbers

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Using two-dimensional (2D) MHD simulations in different Lundquist numbers , we investigate physical regimes of turbulent reconnection and the role of turbulence in enhancing the reconnection rate. Turbulence is externally injected into the system with varying strength. External driven turbulence contributes to the conversion of magnetic energy to kinetic energy flowing out of the reconnection site and thus enhances the reconnection rate. The plasmoids formed in high Lundquist numbers contribute to the fast reconnection rate as well. Moreover, an analysis of the power of turbulence implies its possible association with the generation of plasmoids. Additionally, the presence of turbulence has great impact on the magnetic energy conversion and may be favorable for the Kelvin-Helmholtz (K-H) instability in the magnetic reconnection process.