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Hyper-resistivity in 2D-MHD turbulence ZHIBIN GUO, Peking University & UCSD, P.H. DIAMOND, University of California, San Diego — Many simulations show when turbulence (or instability) develops in an ordinary Sweet- Parker configuration. The current sheet region will enlarge and then the magnetic reconnection rate will largely increase. This indicates that current diffusion, which can be described by a hyper-resistivity term in mean field's evolution equation, plays an important role in turbulence reconnection. Another reason to study hyper-resistivity is turbulence resistivity is constrained by equipartition tendency (such as in 2D-MHD, it is in the same order with collisional resistivity by Zeldovich relation). A method to deal with this fluctuation-mean field problem is through Two-Scale Direct Interaction Approximation (TSDIA), however with it's complex algebra, no calculation is carried. Here, based on a physical assumption, we used a new method to deal with an inhomogeneous mean field evolution in the existence of strong fluctuation. Since it's simple algebra, we can calculate both turbulence resistivity and hyper-resistivity explicitly. The result shows they share a similar structure with quasi-linear one. An estimation is also made which shows the reconnection rate scale.

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