Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Anisotropic Anomalous Thermalization in Turbulence and Its Importance in Magnetic Reconnection HAIHONG CHE, JAMES DRAKE, UMD, M. SWISDAK, NRL — In magnetic reconnection, there has been a long-standing debate about how the anomalous resistivity affects magnetic reconnection, and if anomoluos resistivity can dissipate magnetic energy fast enough to explain the behavior of solar flare and substorm in magnetosphere. We present new results on this issue and its application in magnetic reconnection. Of particular, importance is the relationship between anomalous resistivity and particle heating. Based on quasilinear approximation and statistical concepts, we study how the macroscopic physical process are related to the microscopic instabilities. We define the turbulence-induced anomalous currents and anomalous joule heating tensor, and relate them to the turbulence drag force . We find that the anisotropic turbulence leads to anisotropic dissipation. We calculate the anomalous resistivity that can produce the dissipation required for fast magnetic reconnection. thermalization is on a special direction which leads to a component increase of temperature. The results indicate that the anomalous resistivity is possible to lead a fast magnetic reconnection. We also present a 3D PIC simulation of magnetic reconnection in which the Buneman instability increases the parallel component of electron temperature dramatically.

Haihong Che
UMD

Date submitted: 25 Aug 2006 Electronic form version 1.4