Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

**Fast 2D magnetic reconnection: relating anomalous resistivity and two-fluid MHD models**[1] V.S. LUKIN, M.G. LINTON, Naval Research Laboratory — It is well-known that the laminar 2D uniform resistivity MHD model of magnetic reconnection is too slow to reproduce reconnection rates inferred from astrophysical observations. Several alternative micro-physics models have been developed to address this problem. In particular, it has been shown that both the ion-electron two-fluid model and the anomalous resistivity singe-fluid MHD model are capable of altering the structure of the 2D reconnection region to allow for reconnection rates that are sufficiently fast to be consistent with the observations. Here, we attempt to relate the two models by conducting simulations using both in a large idealized domain. To do so, we take advantage of the freedom to choose a particular form of anomalous resistivity and the existing analytic descriptions of the reconnection region within both models. We use the analytical tools to choose a form of resistivity to reproduce the characteristics of a two-fluid reconnection region and validate it in self-consistent numerical simulations. Implications of the study for using anomalous resistivity to model two-fluid effects in macroscopic MHD simulations will be discussed.

[1]This research is supported by the Office of Naval Research.

Vyacheslav Lukin
Naval Research Laboratory

Date submitted: 15 Jul 2010 Electronic form version 1.4