

Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Anomalous Resistivity in a Slab Geometry WILLIAM TANG, SETH DORFMAN, HONG QIN, HANTAO JI, MASAOKI YAMADA, Center for Magnetic Self-Organization, Princeton Plasma Physics Laboratory — A broad spectrum of electromagnetic fluctuations is often observed during fast magnetic reconnection both in nature and in laboratory experiments such as the Magnetic Reconnection Experiment (MRX). While much past work has focused on fluctuations in the lower hybrid range of frequencies¹, the fluctuation amplitudes are higher at lower frequencies below the ion cyclotron frequency. In the present study, we use linear gyrokinetic theory and a simple Krook collision model to examine the conductivity² in the presence of a density gradient and constant magnetic field in a parameter regime relevant to the strong guide field case in MRX. A simple Fortran code is used to solve the resulting dispersion relation for the coupled drift and Alfvén waves. A robust instability is identified in a broad parameter range. These growing modes are found to have a significant effect on the calculated gyrokinetic conductivity; thus this regime is identified as a promising area for further study with a more complex model. This work was supported by DOE FES Fellowship, DOE, NASA, and NSF.

¹H. Ji, et al., Phys. Rev. Lett. 92, 115001 (2004)

²H. Qin, Princeton PhD Thesis (1998)

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Date submitted: 20 Jul 2007

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