

Abstract Submitted
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Three Dimensional Fast Reconnection in the Magnetohydrodynamic Limit: Theory¹ ETHAN VISHNIAC, McMaster University, ALEX LAZARIAN, University of Wisconsin, GRZEGORZ KOWAL, KATARZYNA OTMIANOWSKA-MAZUR, Jagiellonian University — We examine the role of turbulence in mediating fast reconnection in three dimensions. We work in the single fluid MHD limit, appropriate to the interiors of stars and denser parts of accretion disks, although the model we sketch here should be broadly applicable. In the limit of infinitesimal resistivity, turbulence provides a roughness to the flow and to the magnetic field which renders the definition of magnetic field lines and fluid flow lines somewhat problematic. In this context, we generalize the Sweet-Parker current sheet to include turbulence. We note that in three dimensions this leads to a plasma outflow zone which is much wider than the current sheet, and whose width depends only on the properties of the turbulence. If this sets the speed of reconnection, then it is always of order the local turbulent velocity. We briefly discuss numerical tests of this conjecture and conclude that this conjecture is supported by the available evidence.

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Ethan Vishniac
McMaster University

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