

Abstract for an Invited Paper
for the DPP10 Meeting of
The American Physical Society

Fast and slow two-fluid magnetic reconnection¹

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A two-fluid magnetohydrodynamics (MHD) model of quasi-stationary, two-dimensional magnetic reconnection in an incompressible plasma composed of electrons and ions is presented. Two distinct regimes of slow and fast reconnection are found. The presence of these two regimes can provide a possible explanation for an initial slow build up and the subsequent rapid release of magnetic energy frequently observed in cosmic and laboratory plasmas.

¹This study was supported by the NSF Center for Magnetic Self-Organization (CMSO).