

Abstract Submitted  
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**Reduced Extended MHD** P.J. MORRISON, University of Texas, Austin, H.M. ABDELHAMID, University of Tokyo, D. GRASSO, Politecnico di Torino, R.D. HAZELTINE, University of Texas, Austin, M. LINGAM, Princeton University, E. TASSI, CNRS Luminy — Over the years various reduced fluid models have been obtained for modeling plasmas, with the goal of capturing important physics while maintaining computability. Such models have included the physics contained in various generalizations of Ohm's law, including Hall drift and electron inertia. In a recent publication [1] it was shown that full 3D extended MHD is a Hamiltonian system by finding its noncanonical Poisson bracket. Subsequently, this bracket was shown to be derivable from that for Hall MHD by a series of remarkable transformations [2], which greatly simplifies the proof of the Jacobi identity and allows one to immediately obtain generalizations of the helicity and cross helicity. In this poster we use this structure to obtain exact reduced fluid models with the effects of full two-fluid theory. Results of numerical computations of collisionless reconnection using an exact reduced 4-field model will be presented and analytical comparisons of mode structure of previous reduced models will be made.

[1] H.M. Abdelhamid, Y. Kawazura & Z. Yoshida, J. Phys. A **48**, 235502 (2015)

[2] M. Lingam, P.J. Morrison & G. Miloshevich, Phys. Plasmas **22**, 072111 (2015)

Philip Morrison  
University of Texas at Austin

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