Abstract Submitted
for the APR12 Meeting of
The American Physical Society

Lagrangian and Hamiltonian structure of magnetofluid models with gyroviscous-like contributions ALEXANDER WURM, Western New England University, P.J. MORRISON, University of Texas at Austin — Many magnetofluid theories, like ideal MHD and various reduced models, exhibit a noncanonical Hamiltonian structure when expressed in Eulerian variables [1]. Of particular interest are magnetofluid models that systematically include contributions due to finite ion gyro-radii. Building on the work of Ref. [2] we generalize the so-called gyro-map to three dimensional magnetofluid theories. Starting with the 3D ideal MHD noncanonical Poisson bracket [1] and a Hamiltonian including general gyroviscous terms, we derive equations of motions and compare them to, e.g., Braginskii [3] in the collisionless limit. In addition we explore the Lagrangian version of these theories which use Hamilton's principle to derive the equations of motion [4].

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[3] S.I. Braginskii, in *Review of Plasma Physics*, ed. M.A. Leontovich (Consultants Bureau, New York, 1965), Vol. 1, p. 205.
[4] W.A. Newcomb, Nuclear Fusion: 1962 Suppl. Part 2, p. 451.

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Date submitted: 05 Jan 2012 Electronic form version 1.4