Action Principle Derivation of Reduced Fluid Models

Alexander Wurm[*] and P.J. Morrison

Institute for Fusion Studies and Department of Physics

The University of Texas at Austin

Austin, TX 78712

Abstract

It is well-known that ideal MHD possesses an action principle formulation when it is expressed in terms of Lagrangian (or material) variables, and similar action principles exist for magnetofluid models that include more general equations of state (CGL) or more sophisticated means for momentum transport (gyroviscosity). Starting from these action principles we derive various reduced Hamiltonian models such as reduced MHD and other gyroviscous fluid models.

[1] W.A. Newcomb, Nuclear Fusion: 1962 Suppl. Part 2, p. 451.