

Abstract Submitted
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On Hamiltonian Magnetohydrodynamics: Lagrangian, Eulerian and Dynamically Accessible Stability TOMMASO ANDREUSSI, Alta Space Pisa, Italy, PHILIP J. MORRISON, Physics Dep. University of Texas at Austin, FRANCESCO PEGORARO, Phys. Dept. University of Pisa Italy — Stability conditions of magnetized plasma flows are obtained by exploiting the Hamiltonian structure of the magnetohydrodynamics (MHD) equations by using three kinds of energy principles. First, the Lagrangian variable energy principle is described and sufficient stability conditions are presented. Next, plasma flows are described in terms of Eulerian variables and the noncanonical Hamiltonian formulation of MHD is exploited. For symmetric equilibria, the energy-Casimir principle is expanded to second order and sufficient conditions for stability to symmetric perturbation are obtained. Then, dynamically accessible variations, i.e. variations that explicitly preserve invariants of the system, are introduced and the respective energy principle is considered. General criteria for stability are obtained, along with comparisons between the three different approaches. En route to our results we describe a time-dependent relabeling transformation, which to our knowledge has not heretofore been given, that will be needed in the Lagrangian variable framework in connection with the approach considered in E. A. Frieman, M. Rotenberg, *Rev. Mod. Phys.*, **32**, 898 (1960).

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