

Abstract Submitted
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Lagrangian and topological invariants in extended MHD¹ MAN-ASVI LINGAM, Princeton University — Although extended MHD has been known since the 1950s, systematic studies of its Lagrangian invariants are rare. Here, such a study is undertaken to indicate how the generalizations of the Ertel and helicity invariants can be duly constructed, thereby extending the analysis of [1]. A general procedure for obtaining more intricate Lagrangian invariants is also delineated. The Alfvén theorems, pertaining to flux conservation and magnetofluid connections, are derived for extended MHD. Some exact solutions with a non-trivial topology are presented, and connections with other fields of physics are established. In particular, the MHD topological soliton, discovered in the 1980s, is shown to possess natural counterparts in extended MHD. The consequences of these models in astrophysics and fusion are briefly discussed.

[1] M. Lingam, G. Miloshevich, P. J. Morrison, *Phys. Lett. A*, 380, 2400 (2016)

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