

NOETHER CURRENTS FOR EULERIAN VARIATIONAL PRINCIPLES IN NON-BAROTROPIC MAGNETO- HYDRODYNAMICS AND TOPOLOGICAL CONSERVATIONS LAWS

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ABSTRACT

We derive a Noether current for the Eulerian variational principle of ideal non-barotropic magnetohydrodynamics (MHD). It was shown previously that ideal non-barotropic MHD is mathematically equivalent to a five-function field theory with an induced geometrical structure in the case that field lines cover surfaces and this theory can be described using a variational principle. Here we use various symmetries of the flow to derive novel topological constants of motion through the newly derived Noether current and discuss their implication for non-barotropic MHD and plasma confinement.

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