



Stochastic Lagrangian for the 2D Visco-Resistive Magneto-Hydrodynamics

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Magneto-hydrodynamics in two dimensions, with finite resistivity and viscosity, is of a certain use in all those contexts where the plasma is strongly magnetized in a given direction, so that its relevant dynamics takes place almost only on the plane perpendicular to the strong "guiding" field. This approach is sometimes called *reduced MHD*.

In turbulent conditions, where the medium properties are expected to be irregular, the dissipative terms of viscosity and resistivity can be interpreted as forcing terms of stochastic nature, so to mimic the large fluctuations of microscopic quantities. The statistical dynamics of the system can be then encoded in a stochastic Lagrangian suitably constructed.

In this paper, we obtain the stochastic Lagrangian for the 2D visco-resistive MHD model, where the scalar vorticity ω of the plasma and the axial component of the vector potential ψ are used as dynamical variables. In the case of Gaussian, delta-correlated noises the stochastic Lagrangian is completely calculated, and some possible developments of these results are discussed.