SEMINAR

Formation of current sheets through viscous relaxation

(Sanjay Kumar, USO/PRL)

From Parker's magnetostatic theorem, formation of tangential discontinuities in magnetic field, or current sheets (CSs), are unavoidable in an equilibrium magnetofluid with infinite electrical conductivity and complex magnetic topology. These CSs are due to a failure of a magnetic field achieving force-balance everywhere and preserving its topology while remaining in a spatially continuous state. The magnetic flux surfaces (MFSs) being the possible sites on which CSs develop, describing the magnetofluid evolution in terms of MFSs instead of vector magnetic field provides a direct visualization of the CS formation, helpful in understanding the governing dynamics. In this talk, I will discuss the magneto hydrodynamics simulations in which CS formation is demonstrated by employing an approach that utilizes MFSs. The simulations confirm development of CSs through a favourable contortion of MFSs, as the magneto fluid undergoes a topology-preserving viscous relaxation from an initial non-equilibrium state with twisted magnetic field. A crucial finding of this work is in its demonstration of CS formation at spatial locations away from the magnetic nulls.

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Time: 16:30 hrs

Venue: USO Seminar Hall