

On the topology of partially stochastic magnetic fields

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Abstract

The mapping technique [S.S. Abdullaev, *J. Phys. A: Math. Gen.* **35**, 2811-2832, (2002)], based on Hamiltonian description of magnetic fields using the Clebsch representation, is presented. The DED map, which represents the topology of the magnetic field at the plasma edge of the TEXTOR-DED experiment at the Forschungszentrum Jülich, is derived.

Using the mapping technique, statistical properties of the magnetic field can be calculated, such as the mean square displacement and the diffusion or Lyapunov-exponents and the Kolmogorov-length. The results for such statistical properties are presented. Especially the stable and unstable manifolds of the hyperbolic periodic fixed points are calculated and their relation to the magnetic structures and also the footprints is shown. Further applications of the mapping technique, which are under present consideration, are discussed.