ALPHA PARTICLE LOSSES FROM TOROIDICITY
INDUCED ALFVÉN EIGENMODES

Part I: Phase-Space Topology of Energetic Particle Orbits in Tokamak Plasma

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Abstract

Phase space topology of energetic particles in tokamak plasma with arbitrary shape of cross section is studied based upon the guiding, center theory. Important phase space boundaries such as prompt loss boundary, trapped passing boundary, and other boundaries between classes of nonstandard orbits (e.g. pinch and stagnation orbits) are studied. This phase space topology information is applied to the study of anomalous phase space diffusion due to finite amplitude Alfvén wave fluctuations of energetic particles. The separatrix between trapped and circulating particles contributes dominantly to the losses.

Submitted to Physics of Fluids B, September 1991