

INVARIANTS OF FAST ION MOTION IN STELLARATORS

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S u m m a r y

Approximate expressions for the invariants of motion of charged plasma particles in a stellarator are obtained in two cases: for the passing particles and the particles that always remain trapped by the dominant Fourier harmonic of the magnetic field. In the derivation, the Littlejohn's method of Lie transformations in non-canonical coordinates for Hamiltonian systems is used. The invariants obtained describe the motion of the guiding center of a particle in the absence of collisions. They can be utilized for finding the fast ion orbits and writing the drift kinetic equation. Expressions for the particle motion along the orbits, which are required to analyze the resonances between energetic particles and waves, are obtained as well.