BOUNCE-AVERAGED FLUID EQUATIONS FOR INTERCHANGE DYNAMICS IN A DIPOLE-CONFINED PLASMA

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Abstract

The drift dynamics of trapped particles in the dipole field are described by the evolution of the bounce-averaged particle distribution with adiabatic invariants on time scales that are long compared with the particle's bounce period. The bounce-averaged fluid equations are derived from moments of the collisonless kinetic equations by performing the phase-space integrals for an isotropic plasma with warm electrons and cold ions. We show that the bounce-averaged fluid equations are equivalent to the flux-tube integrated two-fluid equations for describing low-frequency flute-type fluctuations in a dipole-confined plasma.