

Critical values of parameter of pitch-angle scattering particles in loss cone in the near-Earth magnetotail estimation

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We performed trajectory calculations of charged particles with small pitch-angle in the magnetic field imitating the magnetic field in the nightside. We have quantitatively estimated the conditions of pitch-angle scattering of a particle the loss cone during single crossing of the equatorial plane near magnetosphere. The critical values of scattering parameter $K=R_c/r$ are shown to range between 8 to 3 while moving Earthward from 12 to 4 c Re. Calculations were carried out both for particles ensemble and characteristic trajectory, it was shown that K_{cr} for an ensemble of particles could be accurately estimated based on K_{cr} values obtained for characteristic trajectory. The analytical approximation of K_{cr} dependence on the equatorial field magnitude for various models and various magnetosphere conditions was obtained. We also estimated the ratio of precipitating particles flux to the trapped particles flux, for different K_{cr} , to relate our results to date, obtained from spacecraft observations of the isotropic boundaries. Protons with energy about tens of meV and heavy ions with energy about meV were shown to have an effective scattering at distance ~ 4 Re.