

Relativistic Equations of Electron Motion in the Coordinate System of Whistler Mode Cyclotron Resonance

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Nonlinear Doppler-shifted cyclotron resonant electrons interacting with the whistler mode carrier signal are probable to generate sideband waves in the magnetosphere. According to Ikeda et al. (1988) and Ikeda (2002), these electrons may have the energy perpendicular to the external magnetic field, $E_{\perp} = 2\text{KeV} - 14\text{KeV}$. So far, the electrons included in this energy range have been dealt with non-relativistic mechanics of whistler-mode resonance interaction. In this meeting, the author examines whether the relativistic treatment is necessary for this problem. For example, Lorentz factor ($=1 + E_{\perp}/m_0 c^2$) is calculated for the energy range described above. Then, it corresponds to 1.01 ~ 1.03, where m_0 is the rest mass of electron and c is the light speed. The trajectories of resonance electrons calculated by the special theory of relativity are examined in comparison with those of non-relativistic conditions.