Relativistic electron acceleration by whistler chorus elements including de-trapping effect: GEMSIS-RBW simulations

Shinji Saito[1]; Yoshizumi Miyoshi[2]; Kanako Seki[2]
[1] Nagoya Univ.; [2] STEL, Nagoya Univ.

Test-particle simulations have been done to demonstrate relativistic electron flux enhancement by whistler chorus elements propagating parallel to the magnetic field line of the dipole model. In this model it assumes that the whistler chorus elements periodically enhanced at the magnetic equator propagate both northern and southern directions simultaneously. These elements interact with electrons moving along the magnetic field line, and change their pitch angle and energy. The test-particle simulations show that, in identically coherent whistler chorus element, some electrons are nonlinearly trapped and are strongly accelerated through the relativistic turning acceleration process. On the other hand, by assuming that the condition for the trapping is broken in the element during the nonlinear trapping, electrons are de-trapped and the nonlinear effect in electron acceleration is hidden behind a diffusive process. Resent observational results indicate that whistler chorus element consists of several sub-packets of whistler waves which cause the de-trapping during electron nonlinear acceleration. Our simulations suggest that sub-packets structure in the whistler chorus element controls the efficiency of relativistic electron enhancement.