

Simulation of interaction between energetic plasmas and EMIC triggered emissions

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Electromagnetic ion cyclotron (EMIC) rising-tone (triggered) emission is known as a fine structure of EMIC waves. Theoretical studies suggest that EMIC triggered emissions can induce significant loss of the relativistic electrons through the nonlinear trapping. We perform test particle simulations of the electrons interacting with the EMIC triggered emissions reproduced by real scale hybrid simulation. Relativistic electrons with a few MeV kinetic energy are scattered in wide pitch angle range. The lower energetic electrons are also scattered since the frequency of the triggered emissions reaches near the proton cyclotron frequency and the helium band waves are also induced close to the helium gyro frequency. Broadband EMIC rising waves generated in the small ambient magnetic field gradient model cause rapid precipitation of the relativistic electrons. Simultaneous precipitations of the energetic protons and relativistic electrons are also reproduced in the hybrid and test particle simulations, respectively.

Keywords: EMIC waves, nonlinear wave particle interaction, computer simulation