EMICトリガード放射と相互作用する相対論的電子のシミュレーション

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Simulation of relativistic electrons interacted with EMIC triggered emissions

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We perform test particle simulations of relativistic electrons interacting with electromagnetic ion cyclotron (EMIC) triggered emissions. EMIC triggered emissions are characterized by large wave amplitudes, rising-tone frequencies, and coherent left-handed circularly polarized waves. EMIC triggered emissions are generated by energetic protons injected into the inner magnetosphere. We study trajectories of relativistic electrons drifting eastwards interacting with longitudinally distributed EMIC triggered emissions. Relativistic radiation belt electrons interact with EMIC triggered emissions, some are trapped by wave potentials and efficiently guided down to lower pitch angles. Repeated interactions occur due to the mirror motion, and result in the scattering of particles into the loss cone. We use two EMIC wave models for the test particle simulations. One assumes that the wave amplitude is constant and the other assumes a time dependent wave amplitude that characterizes sub-packets. For both models, approximately 25% of the total injected number of particles in the energy range 0.5-6.0 MeV are precipitated of a time scale 2 minutes. We determine the timing, distribution in pitch angle, and longitudinal location of the relativistic electron precipitation with respect to different particle energies.