Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)
©2013. Japan Geoscience Union. All Rights Reserved.

PEM07-21 Room:105 Time:May 22 16:30-16:45

Triggering Process of Electromagnetic Ion Cyclotron Rising Tone Emissions in the Inner Magnetosphere

Masafumi Shoji[1*], Yoshiharu Omura[2]

[1]Institute of Space and Astronautical Science, [2]Research Institute for Sustainable Humanosphere

Spacecraft observations and simulations show generation of coherent Electromagnetic ion cyclotron (EMIC) triggered emissions with rising-tone frequencies. In the inner magnetosphere, the spontaneously triggered EMIC waves are generated by the protons with large temperature anisotropy. We reproduced EMIC triggered emissions in the Earth's magnetosphere by real scale hybrid simulations with cylindrical magnetic geometry. We obtained spontaneously triggered nonlinear EMIC waves with rising frequencies in H+ band of the EMIC dispersion relation. The proton holes in the phase space are formed. We have also derived the theoretical optimum wave amplitude for triggering process of the EMIC nonlinear wave growth. The optimum wave amplitude and the nonlinear transition time show a good agreement with the present simulation result. The nonlinear wave growth over a limited time forms a sub-packet structure of a rising tone emission. The formation process of a sub-packet is repeated because of a new triggering wave generated by the phase-organized protons, which are released from the foregoing sub-packet. Then the EMIC triggered emission is observed as a train of sub-packets generated at different rising frequencies.

Keywords: EMIC wave, triggered emission, wave particle interaction, hybrid simulation