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Zoom meeting D ：11/4 PM1 (13:45-15:30)
14:45〜15:00

Simulation Study on Parametric Dependence of Whistler-mode Hiss Generation in the Plasmasphere

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We conduct electromagnetic particle simulations to examine the applicability of nonlinear wave growth theory to the generation process of plasmaspheric hiss. We firstly vary the gradient of background magnetic field from a realistic model to a rather steep gradient model. Under such variation, the threshold amplitude in the nonlinear theory increases quickly and the overlap between threshold and optimum amplitude disappears correspondingly, and the nonlinear process is suppressed. In the simulations, as we enlarge the gradient variation of the background magnatic field, waves generated near the equator do not grow through propagation. By examining extracted typical wave packets from different gradient cases, we find the generation of wave packets is limited to equatorial region when background field is steep, showing a good agreement with what is indicated by critical distance in the theory. We then check the dependence of generation of hiss emissions on different hot electron densities. Since the overlap between threshold and optimum amplitude vanishes, the nonlinear process is weakened when hot electron density becomes smaller. In the simulation results, we find similar wave structures in all density cases, yet with different magnitudes. The existence of suitable values of the inhomogeneity factor S implies that nonlinear process occurs even at a low level of hot electron density. However, by examining JE which is closely related to the wave growth, we find energy conveyed from particles to waves is much limited in small density cases. Therefore, the nonlinear process is suppressed when hot electron density is small, which is in agreement with the theoretical analysis.