

Development of low noise particle simulation code

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In the previous particle simulation studies on generation mechanisms of high frequency electromagnetic waves such as whistler mode chorus emissions, electrostatic component of the electric field was neglected because of its high thermal noise characteristic in particle simulations.

Recently, delta-f method was developed which is a plasma simulation method with low noise characteristic, and is now studied for various applications.

With the delta-f method, only the perturbed part of velocity distribution of particles are computed, so the thermal noise corresponding to the equilibrium part of velocity distribution is removed.

Then we attempt to apply the delta-f method to the studies on the generation mechanisms of whistler mode chorus emissions.

At first, we developed the electrostatic simulation code with delta-f method and analyzed electrostatic instabilities. Then we expand the code to the electromagnetic one and apply it to the problem.