Phase synthesis of the quasi-resonant currents which may generate self-exciting whistler-mode sideband waves

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It is necessary to investigate if the resonant interaction between a quasi-monochromatic carrier whistler wave and untrapped electrons can give rise to self-exciting whistler mode sideband waves with discrete frequencies or gap frequencies. The equation system presented to the untrapped electrons has two groups of motion; namely the pendulum equation system and the perturbation equation system. The perturbation one can give the solitary wave solutions of the perturbed phases fluctuating in the sech square potential. The Eigen values obtained from the perturbation equation system can give the resonance conditions. The nonlinear characteristics are even more strengthened in the resonance conditions. As a result, whistler mode sideband waves are radiated from these phase synthesis currents.

It is necessary to investigate if the resonant interaction between a quasi-monochromatic carrier whistler wave and untrapped electrons outside the separatrix can give rise to self-exciting whistler mode sideband waves with discrete frequencies or gap frequencies in a special conditions.

The equation system newly presented to the untrapped electrons has two groups of motion equations; namely one of them is the pendulum equation system, and another one is the perturbation equation system. The perturbation equations expressing phase changes of electrons can give the solitary wave solutions of the perturbed phases fluctuating in the sech square potential. Furthermore, it is thought that the Eigen values obtained from the perturbation equation system can give the resonance conditions, the trajectories of electron motion and the sideband frequencies of whistler mode. Because it is imagined that the nonlinear characteristics are even more strengthened in the resonance conditions, the nonlinear currents can be generated and won't disappear. As a result, whistler mode sideband waves are radiated from these phase synthesis currents. If it's not so, the spectra of the whistler mode sideband waves may not correspond to the one observed actually. However, as a result of numerical calculation, the phase synthesis currents became much reduced in intensity, compared with the case of the whistler sideband currents without synthesis. It is necessary to investigate if these discrete spectra or the spectra with gap can be actually observed, when they can be produced in the magnetosphere.

Moreover, some solitary wave solutions obtained from the perturbation equations for velocity phase of untrapped electron may be also reported in this meeting.