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Stability properties of the ion distribution function with velocity space holes

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Study of particle dynamics in the Earth's magnetotail has shown that some ions with large pitch angle are preferentially accelerated out of neutral sheet and form beams. As a result a peculiar type of nongyrotropic ion distribution with velocity space hole is formed. The unique feature of such distribution is that the space hole is centered on $90ˆ\circ$ pitch angle and ion distribution is not symmetrical about magnetic field direction. Ion distributions with empty region in velocity space represent a source of free energy for excitation as plasma waves as electromagnetic waves and may have a pronounced effect on physical processes in the neutral sheet. The investigation of general stability properties of the nongyrotropic ion distributions in relation to electrostatic wave excitation was performed earlier.

It was shown that such distributions are unstable to the electromagnetic waves generation and the investigation of stability properties of such ion distribution in the relation to electromagnetic waves was done. The dependence of the growth rate upon the ion hole parameters and ion and electron temperatures was obtained.

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