

CAN THE RELATIVISTIC MASER MECHANISM CAUSE THE STRONG EMISSIONS REGISTERED BY CLUSTER AND DEMETER SATELLITES IN THE POLAR CUSP?

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Abstract

The emissions with extremely high intensity around electron cyclotron frequency have been sometimes registered by satellite Magion 4 - companion of Interball 1. These waves correlate with strong fluxes of high energetic electrons often observed within the polar cusp by Interball 1 and Magion 4 as well as by Polar satellites. Multipoint measurements done by Cluster satellites give new insight of these emissions. Taking into account the plasma and magnetic field parameters in the polar cusp as well as geometry of the waves propagation, one has found that one type of these emissions can be generated by so called "fan instability" (FI), but as a source of the emissions around electron cyclotron frequency the 'horse shoe' instability has been also discussed. Beam instability and interaction of Langmuir waves with energetic electrons give the broad band emissions around plasma frequency, which can be discussed as Langmuir turbulence (LT). Kilometric radiation (KR) typical for auroral zone is observed in the vicinity of the cusp's boundary and is associated with fluxes of electrons with energy up to 100keV. The wave measurements done by DEMETER satellite in the polar cusp at the ionospheric level shown similar effects to registered by Interball and Cluster in the outer cusp. The presence of the energetic electrons during the bursts of the plasma waves can suggest another mechanism - relativistic maser instability. The discussion of the possibility of this mechanism in relation to the presented observation will be given in our paper.

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