Abstract Details

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Category: Non-linear Geophysics

Paper ID: 57-ONL-A1977

Title: NL1/SP19: Auroral Electron Acceleration by Dissipative Nonlinear Kin Alfven Wave

Abstract:

In this report, a model for dissipative nonlinear kinetic Alfven wave (DNKAW) with a short wavelength in a low beta plasma is introduced applied to the auroral plasma. In particular, its role in auroral electror acceleration is further discussed. The scenario for auroral electron acceleration and auroral arc formation can be briefly described below. Nonlinear IAWs, which are produced by some generators (for instance flows or pressure gradients in the plasma sheet, propagate into the a zone along the Earth's magnetic field lines. Then they dynamically ev into a train of DNKAWs due to dissipation in the auroral acceleration r where DNKAWs can most easily form and then these DNKAWs are tra the auroral electron acceleration region due to the reflection by the ionosphere or by gradients of the Alfven velocity. When propagating downwards they accelerate electrons upwards and produce upgoing energetic electron flows (i.e., field-aligned currents downwards), and propagating upwards they accelerate electrons but downwards and pr downgoing energetic electron flows (i.e., field-aligned currents upwar is the latter that leads to aurora. In the DNKAW acceleration mechani field-aligned energetic electrons with energies in the order of keV can produced in a rather wide altitude range from 3,000 km to 15,000 km the ionosphere, and that the DNKAW acceleration can provide higher accelerating efficiency and energy for auroral energetic electrons in th observed acceleration region, which is between 5,000 km and 12,000 implied based on observations. The most efficient acceleration occurs altitude of 5,100 km, which is just close to the bottom of the accelera region. In particular, the highest energy of auroral electrons in the DN acceleration, which are produced at the same altitude, is about 10.5 k a proper altitude model of the background plasma parameters in the zone and density jump of local DNKAWs. We suggest that this can in explain the precipitous decrease towards energies above 10 keV in th observed auroral electron energy spectrum, because strong DNKAW e with a relative density jump larger than 50% are, in general, rather r observations. Typical widths of auroral arcs caused by the DNKAW acceleration can be estimated from the field-aligned projection of the scale width of DNKAWs on the ionosphere, because auroral electrons precipitate along the field lines into the ionosphere. The results show the typical widths of auroral arcs caused by the DNKAW acceleration i