



The role of shears in the parallel drift of ionospheric particles in excitation of electrostatic waves

Alexander Chernyshov (1,2), Irina Golovchanskaya (3), Boris Kozelov (3), Dmitry Chugunin (1,2), and Mikhail Mogilevsky (1)

(1) Space Research Institute of RAS, Space Plasma Physics, Moscow, Russian Federation (achernyshov@iki.rssi.ru), (2) West Department of Pushkov IZMIRAN of RAS, Kaliningrad, Russian Federation, (3) Polar Geophysical Institute, Apatity, Murmansk region, Russian Federation

The presence of the broadband electrostatic emissions, which are routinely observed by satellites, can be understood on the basis of the existing theories of electrostatic wave generation in inhomogeneous equilibrium configurations. Satellite observations show that the electrostatic instability, which is expected to occur in most cases due to an inhomogeneous energy density caused by a strongly inhomogeneous transverse electric field, sometimes does not develop inside nonlinear plasma structures in the high-latitude region, even though the velocity shear is sufficient for its excitation. In this study, it is shown that the instability damping can be caused by out-of-phase variations of electric field and field-aligned current inside these structures. The sources of free energy required for the wave generation do not generally act in unison so that their combined effect turns out to be close to zero.

The work was partly supported by Russian Science Foundation №17-77-20009.