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Modelling of parameters changes in the mid-latitude ionosphere in the presence of strong electric fields

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It is known that during periods of enhanced geomagnetic activity there are very fast convection flows in the inner magnetosphere near the plasmapause - Polarization Jet (PJ, or SAID). The existence of strong electric field like in PJ (the ExB drift velocity in the PJ band at ionospheric altitudes is \sim 1-5 km/sec) in the ionosphere leads to dramatic changes of thermal plasma and outflow properties. Due to heating of ions in the F–layer, the plasma density drops and Pedersen conductivity decreases. Using multi-ion one-dimensional MHD model TUBE-7 of upper ionosphere dynamics we calculate height profiles of electron and ions concentrations and temperatures in the presence of fast ExB drifts (1-5 km/sec). Based on results obtained we study the conductivities changes depending from ExB drift velocity (intensity of electric field) and initial conditions of magnetic tube state (plasma density, temperature etc.). As the conductivity changes influence on magnetospheric electric field pattern, estimation of conductivity changes is allowed to take into account additional effect of ionosphere dynamics on magnetosphere.

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