LARGE-SCALE FIELD-ALIGNED CURRENTS DISTRIBUTION MODELLED AS NONLINEAR MODES GENERATED BY SOLAR WIND AND INTERPLANETARY MAGNETIC FIELD VARIATIONS

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Large scale field-aligned current (FAC) variations at high latitudes have been modelled as nonlinear (NL) MHD modes generated by solar wind-Earth's magnetosphere interaction (Nenovski, 2003,2008). This NL-mode FAC model yields quantitatively FAC structures and FAC intensity distribution at higher latitudes (above 60 degrees) depending on the solar wind and interplanetary magnetic field (IMF) variations and magnetosphere-ionosphere state. The latter is taken into account by their spatial extent and latitude position.
In this report the dependences of large scale FAC density and strength distribution in both hemispheres on i) Earth dipole's tilt and ii) interplanetary magnetic field (IMF) component By are thoroughly examined for solstice and equinox conditions. Differences in the FAC density and strength in summer and winter hemispheres are produced by different attack angle of solar wind velocity with magnetic field fluxes in the high latitude near-Earth magnetosphere. This finding corresponds to experimental evidences that summer (sunlit) high-latitude ionosphere possesses more intense FAC structures in comparison to those in winter high-latitude ionosphere. The influence of the IMF component By results in a spiral-like structure of FAC regions. The latter emerges around noon sector and satisfactorily explains DPY signature known from ground-based measurements.

Keywords: Field-aligned currents (FAC), Interplanetary magnetic field (IMF), Earth's tilt.

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