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A three-dimensional dynamic model of the plasmasphere based on the kinetic approach

The plasmasphere is the extension of the ionosphere at higher altitudes in the inner magnetosphere. A three dimensional physical dynamic model of the plasmasphere that is constrained by realistic data has been developed at BISA. The core of the plasmasphere is obtained from the kinetic exospheric approach assuming a kappa velocity distribution function for the particles. The relative abundance of trapped particles is constrained so that the density profiles correspond to ISEE satellite observations. The position of the plasmapause, the limit of the plasmasphere, is determined by the interchange instability mechanism. The electric field model is a combination of corotation and E5D convection empirical model, which depends on the level of geomagnetic activity. The deformation of the plasmasphere during quiet and disturbed geomagnetic periods is illustrated and compared with the results of other plasmasphere is extended to radial distances larger than 4 Re. During geomagnetic storms and substorms, the plasmasphere is eroded. Plumes are formed in the afternoon MLT sector and then rotate with the Earth.