

Determination of electron density profile in the plasmasphere deduced from wave data using a stochastic differential model

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We propose a new method to determine a global density profile using the spacecraft observation data of electron density and VLF waves along the trajectories. In our method, we take into account stochastic fluctuations of the electron density profile in the plasmasphere using a stochastic differential model in the latitudinal density variation. We assume a diffusive equilibrium density profile in the plasmasphere along geomagnetic field lines. Unknown parameters in our model are determined by non-linear least square fitting which minimizes the differences between observed wave data and those theoretically calculated by ray tracing. In this method, local fluctuations along the trajectories are removed and the global density distribution is appropriately reconstructed.