# Radial diffusion coefficient for the inner electron radiation belt

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The flux variation of the electron radiation belt with geomagnetic activity have been studied by both observational and theoretical approach in two-decade, however the exact mechanism has been a puzzle. In classical theory, the electron flux variations has been explained by the radial diffusion caused by the electrostatic and the electromagnetic fluctuations, but the wave-particle interaction at the center of the outer belt is implied as an acceleration mechanism in recent. On the other hand, the inner belt is more stable and the flux variation in the inner belt is smaller than that of the outer belt so that the inner belt has not been attracted.

Even if there is the acceleration mechanism at the center of the outer belt, the radial diffusion mechanism plays an important role for the rearrangement of the electron flux. Especially at the slot region and the inner belt, the temporal and spatial structure of the electron flux is supposed to be dominated by the radial diffusion. Therefore, it is important to know the radial profile of the radial diffusion coefficient in order to understand the radiation belt dynamics.

The Kp-dependent radial diffusion coefficients formulated by Brautigam and Albert (2000) are usually used in the time-dependent radial diffusion model. Because their coefficients are based on the observation of the outer belt, it is not appropriate to apply them to the slot and the inner belt regions. In fact, extrapolating these diffusion coefficients to the slot and the inner belt and carrying out numerical simulation, the slot is not formed and the electron flux near the Earth is extremely large.

In this study, in order to find a radial diffusion coefficient that can apply for the inner electron radiation belt as well as the outer belt, we performed some simulations by using the time-dependent radial diffusion model assuming that several types of the amplitude and the profile of the electrostatic field fluctuation. We evaluated the profile of the radial diffusion coefficient from comparison of the observational data obtained by TSUBASA satellite with the simulations.