The density of field-alligned currents at the plasma sheet boundary: Cluster observation

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We studied the Field-Aligned Currents (FACs) density at the Plasma Sheet Boundary Layers (PSBL) using the curlometer technique with the data from the FGM onboard the four Cluster spacecraft in the period of July to October 2001. By calculation we got large numbers of FAC samples. In the samples, most of FAC densities were very small and around zero. These small values of FAC densities were caused by some errors and noise. In order to get the real FAC density distribution, we used a three-Gaussian distribution to fit the errors from -2 pT / km to +2 pT / km and extended the fitted error distribution function to all calculated current values. Then we subtract the estimated noise contribution from the full distribution, and then, the result showed that, for earthward FACs most currents densities are +3.1 pT / km and for tailward FACs most currents densities are -3.4 pT / km. This is important for studying the characteristic of FACs at PSBL.