Nonlinear Electric Field Structures at Plasma Boundaries in the Inner Magnetosphere

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Van Allen Probes observations demonstrate that kinetic-scale nonlinear electric field structures, including double layers and phase space holes, are frequently observed in the inner magnetosphere (< 6 Earth radii) over a range of radial distances and magnetic local times. These structures are often observed in association with earthward plasma flows or when the Van Allen Probes spacecraft encounter the earthward edge of the plasma sheet boundary layer. In both cases, large scale plasma flows within the terrestrial magnetosphere result in sharp boundaries between plasmas with disparate properties (e.g. temperature, density). Because kinetic-scale electric field structures can be formed by the relaxation of unstable plasma distributions, these electric field structures may be useful for identifying localized regions of active particle distribution homogenization (therefore regions of energy redistribution) at plasma boundaries in the inner magnetosphere.