

Simulated Injection of Relativistic Electrons

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Relativistic particles in space plasmas, particularly electrons, pose a serious hazard to both man and machine. The energization mechanism of these particles, which occurs during magnetic substorms, is not well understood. Following *Li et al.* [1], we try to understand this process as a result of magnetic field dipolarization with an induced electric field. We integrate ensembles of test particles using the relativistic guiding center equations of motion, where the first adiabatic invariant is conserved, to estimate the fluxes of energetic electrons at geosynchronous orbit. We also integrate ensembles of protons comparing the guiding center orbits with the full Lorentz force orbits. We attempt to estimate the fraction of protons starting in the geotail that become trapped in the inner magnetosphere compared with the fraction that leave the system through the dayside magnetopause.

References

- [1] Xinlin Li, D. N. Baker, M. Temerin, G. D. Reeves, R. D. Belian. Simulation of dispersionless injections and drift echoes of energetic electrons associated with substorms. *GRL* **25**, 20, 3763-3766.

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