

Abstract Submitted
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Probing the Earth's magnetosphere with an electron gun GIAN LUCA DELZANNO, ENRICO CAMPOREALE, LANL, ERIK HOGAN, University of Colorado, J. DAVID MOULTON, LANL, JOSEPH BOROVSKY, Space Science Institute, ELIZABETH MACDONALD, MICHELLE THOMSEN, LANL — The ability to unambiguously connect different parts of magnetosphere and ionosphere through magnetic field line tracing is critical to the understanding of the coupling between these two systems. A possible way to achieve this goal could use a magnetospheric spacecraft to emit an energetic electron beam along the local magnetic field and detect the emission optically at the magnetic foot-point in the ionosphere. In this idea it is critical to keep the spacecraft charging under control by emitting a contactor plasma before firing the beam. We present an overview of our effort to tackle this complex problem. We will focus on: (1) the further development of the Particle-In-Cell (PIC) code CPIC used for this study. CPIC couples the standard PIC algorithm with the generation and adaptation of the computational grid; (2) the widely-used static modeling of the contactor plasma and its inadequacy in some parameter regimes; (3) the PIC modeling of the contactor plasma injected across a static magnetic field and the possible development of instabilities at the edges of the contactor cloud, complemented by a simplified linear stability analysis to highlight the physics of these instabilities.

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