RAM-SCB SIMULATIONS OF THE NEAR-EARTH MAGNETOSPHERE: EFFECT OF PLASMA SHEET CONDITIONS AND MAGNETIC COUPLING ON THE RING CURRENT/REGION 2 FIELD-ALIGNED CURRENTS

SORIN G. ZAHARIA, Vania K. Jordanova and Daniel T. Welling

Los Alamos National Laboratory, Los Alamos, NM, USA, e-mail: szaharia@lanl.gov

Accurately modeling the dynamics of the inner magnetosphere and near-Earth plasma sheet requires proper treatment of both kinetic drift physics and the interaction between particles and fields. During geomagnetic storms, the magnetic field is strongly depressed by the large ring current plasma pressure, and the changed field influences significantly the dynamic evolution of the plasma. To treat this self-consistent interaction we have developed a self-consistent inner magnetosphere code (RAM-SCB) by coupling the kinetic ring current-atmosphere interactions model (RAM) with an Euler potential-based 3D plasma equilibrium code. In our approach, the magnetic field is computed in force balance with the RAM anisotropic pressures (anisotropy being critically important for the excitation of EMIC waves), and then fed back into RAM. The model boundary has been expanded to 10 R_E in the plasma sheet with plasma pressure/magnetic field boundary conditions prescribed there from observations or other models (empirical or first principles). This presentation will illustrate storm-time RAM-SCB simulations of the near-Earth magnetosphere, comparison of model results with available particle/field observations (from POLAR, CLUSTER, and GOES spacecraft), and physics insight into how the model results (plasma pressure, magnetic field, Region 2 currents) depend on 1). plasma sheet conditions (density, temperature, assumed ion composition) and 2). the coupling between the magnetic field and plasma pressure.

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Sorin Zaharia, Los Alamos National Laboratory, MS D466, P.O. Box 1663, Los Alamos, NM 87545, USA Tel. +1 (505) 667-0303 Fax +1 (505) 665-7395 Email: szaharia@lanl.gov