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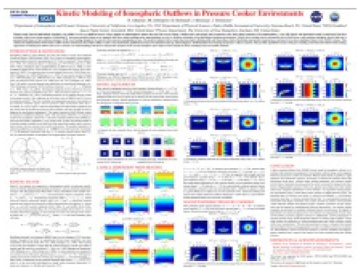
Poster
Plasma escape from the high-latitude ionosphere (ion outflow) serves as a significant source of heavy plasma to the magnetospheric plasma sheet and ring current regions. Outflows alter mass density and reconnection rates, hence global responses of the magnetosphere. A new fully kinetic and semi-kinetic model, KAOS (Kinetic model of Auroral ion OutflowS), is constructed from first principles which traces large numbers of individual O+ ion macro-particles along curved magnetic field lines, using a guiding-center approximation, in order to facilitate calculation of ion distribution functions and moments. Particle forces include mirror and parallel electric field forces, a self-consistent ambipolar electric field, and a parameterized source of ion cyclotron resonance (ICR) wave heating, thought to be central to the transverse energization of ions. The model is initiated with a steady-state ion density altitude profile and Maxwellian velocity distribution and particle trajectories are advanced via a direct simulation Monte Carlo (DSMC) scheme. This outlines the implementation of the kinetic outflow model, demonstrates the model's ability to achieve near-hydrostatic equilibrium necessary for simulation spin-up, and investigates L-shell dependent wave heating and pressure cookers scenarios. This paper illustrates the model initialization process and numerical investigations of L-shell dependent outflows and pressure cooker environments and serves to advance our understanding of the drivers and particle dynamics in the auroral ionosphere.

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