"Investigating the Impact of Field-Aligned Potential Drops on Auroral Energy Flux and Conductance: Insights from RCM Simulations"

Sina Sadeghzadeh, Rice University

Abstract

Field-aligned potential drops (FAPDs) are electric potential differences that occur parallel to Earth's magnetic field lines and play a crucial role in various plasma phenomena in regions of plasma instability, such as the auroral zones. FAPDs are known to influence the acceleration of charged particles, the generation of field-aligned currents (FACs), and the coupling between the ionosphere and magnetosphere. Their presence is believed to contribute to energetic particle precipitation events in the auroral zone and significantly affects the energy flux of electrons and ionospheric conductance. In this talk, we present an initial attempt to examine the influence of incorporating FAPDs on auroral energy flux and conductance using the Rice Convection Model (RCM), which includes the effect of low-entropy bubbles. Our experiment involved conducting two simulations of bubble injections: one considering the effect of FAPDs ($R \neq 0$, where R denotes field-aligned resistivity) and another without FAPDs ($R = 0$). Our findings demonstrate that including FAPDs in the simulations (i.e., when $R \neq 0$) enhances the energy flux of precipitating electrons and influences ionospheric conductance.