

Electrostatic potentials in the auroral particle acceleration region with the effect of the up-flowing ions

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We studied the formation process of weak double layer in the auroral acceleration region by one-dimensional electrostatic full particle simulation. The weak double layer is formed as a consequence of the nonlinear growth of ion acoustic waves, which are excited by the interaction between the magnetospheric hot electrons and the ionospheric cold ions.

According to satellite observations, an upward hot ion beam exists in the auroral acceleration region. The profile of potential structure of weak double layer is modified by this hot ion beam. The formation of the weak double layer depends on the ion beam drift velocity as well as the density ratio of the hot ions to the cold ions.