A growth of the electrostatic potential on the auroral particle acceleration region with the effect of the up-flowing ions

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We studied the formation process of potential drops in the auroral region, known as a weak double layer (WDL) with one-dimensional electrostatic particle simulation code. WDLs are a consequence of the nonlinear development of ion acoustic waves. According to satellite observations, an upward hot ion beam exists in the auroral acceleration region, hence, the profile of potential structure of WDLs is modified with this hot ion beam. The drift velocity of beam ions and the density ratio between hot ions and cold ions differ along the magnetic field line, which brings different conditions at various altitudes. We will discuss the growth of the total potential drop considering the composition of particles along the field line.