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How do double layers form inside the auroral cavity? DANIEL MAIN, John Brown University, DAVID NEWMAN, CIPS/University of Colorado, CLARK SCHOLZ, John Brown University, ROBERT ERGUN, LASP/University of Colorado — One of the unresolved questions in auroral physics is how the auroral potential drop is distributed. One view is that a near-uniform ambipolar electric field (with $\sim$ mV/m electric field amplitudes) exists along auroral magnetic field lines which, when integrated, leads to auroral potential drops of $\sim 10^4$ V. Another view is that the field lines are populated by a number of discrete double layers (with amplitudes of a few hundred mV/m) which, when added up, can also leads to auroral potential drops of $\sim 10^4$ V. The actual field distribution may combine elements of both models. Here, we consider the second model focusing on the upward current region. We present results from one and two-dimensional Particle-in-Cell simulations of double layers (DLs) in the interior of the auroral cavity, known as "mid-cavity" DLs (Ergun et. al.,2004). The simulations include hot H^+ magnetospheric ions and electrons, cold dense ionospheric electrons, and H^+ and O^+ beams. We show that upon the formation of a DL at the ionosphere-auroral cavity boundary, the non-linear evolution of the ion beams in the auroral cavity leads to an earthward traveling H^+ beam. This H^+ beam interacts with the anti-earthward H^+ beam forming an ion acoustic soliton and a candidate mid-cavity DL. FAST data in support of this interpretation are presented.

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