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Nonlinear electron acoustic structures generated on the high-potential side of a double-layer

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High-time resolution measurements of the electron distribution function performed in the auroral upward current region reveals a large asymmetry between the low- and high-potential sides of a double-layer. The latter side is characterized by a large enhancement of a locally trapped electron population which corresponds to a significant part (ũp to 30%) of the total electron density. As compared to the background hot electron population, this trapped component has a very cold temperature in the direction parallel to the static magnetic field. Accordingly, the differential drift between the trapped and background hot electron populations generates high frequency electron acoustic waves in a direction quasi-parallel to the magnetic field. The density of the trapped electron population can be deduced from the frequency where the electron acoustic spectrum maximizes. In the auroral midcavity region, the electron acoustic waves may be modulated by an additional turbulence generated in the ion acoustic range thanks to the presence of a pre-accelerated ion beam located on the high-potential side of the double layer. Electron holes characterized by bipolar pulses in the electric field are sometimes detected in correlation with these electron acoustic wave packets.