

## Role of Two-Electron-Population Plasma Expansion in Auroral Acceleration

## NAGENDRA SINGH

University of Alabama in Huntsville, USA

Since the days of S3-3, the observations have shown that in order to balance the momentum of ion escaping above the auroral electrostatic shocks as ion beams, ions must undergo preacceleration at low altitudes. Normally over the years, the pre-acceleration of ions is explained in terms of wave-particle interactions. The existence of a warm electron population as secondary and backscattered electrons in the midst of ionospheric cold and dense plasma is known since the early days of space observations. Such warm electrons facilitate the upward expansion of the ionospheric ions and accelerate ions. When the density and temperature of the warm electron population reach critical values, the expansion generates a rarefaction shock. This shock is like a double layer with a parallel potential drop equivalent to the warm electron temperature. The shock separates the dense and cold ionospheric plasma from the hot and tenuous plasma of the magnetospheric origin. Thus the shock becomes the lower end of the auroral density cavity as well as the lower layer of electron and ion acceleration inferred from satellites. In order to corroborate these ideas, we will present both satellite observations and results from numerical simulations of auroral flux tubes.