

# **Broadband electrostatic noise and low-frequency waves in the Earth's magnetosphere**

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Broadband electrostatic noise (BEN) is commonly observed in the different regions of the Earth's magnetosphere, eg., auroral region, plasma sheet boundary layer etc. The frequency of these BENs lies in the range from lower hybrid to the local electron plasma frequency and sometimes even higher. Spacecraft observations suggest that the high and low frequency parts of BEN appear to be two different wave modes. There is well established theory for the high frequency part which can be explained by electrostatic solitary waves, however, low-frequency part is yet to be fully understood. The linear theory of low frequency waves is developed in four-component magnetized plasma consisting of three types of electrons, namely cold background electron, warm electrons, warm electron beam and ions. The electrostatic dispersion relation is solved, both analytically and numerically for the cold as well as hot ion limits. The results are applied to explain some features of the low-frequency part of the broadband electrostatic noise observed.