

# MODULATIONAL INTERACTION OF LOWER-HYBRID WAVES WITH INERTIAL ALFVEN WAVES IN THE AURORAL IONOSPHERE

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Lower-hybrid solitary structures are frequently observed localized enhancements in electrostatic fluctuations in the auroral regions of the Earth's ionosphere. The frequency of fluctuations are typically of the order of lower-hybrid frequency, the typical perpendicular spatial scales are of the order of electron skin depth and they are strongly elongated along the ambient magnetic field. They are also known as lower-hybrid cavities in literature because they are observed to be associated with depletions of the order of a few percent in the local plasma density. The present research investigates the mechanism for the formation of these structures. Particularly a scenario is considered where the lower-hybrid waves lead to the formation of background density irregularities due to their Reynolds' stresses. It is shown that, with the wave amplitudes observed in auroral ionosphere, the lower hybrid waves do have significant effect on the background plasma by means of excitation of certain compressional plasma modes, particularly inertial Alfvén mode. The effect of background density modulations on the lower-hybrid waves are also investigated by means of geometrical optics. By self consistent analysis of the equations governing the interaction of lower-hybrid waves with density fluctuations associated with the inertial Alfvén mode, it is shown that the interaction of these two types of wave modes leads to modulational instability.