



The role of Alfvén waves in redistributing energy in the magnetosphere - ionosphere system

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There are many dynamic processes in the magnetosphere which cause electromagnetic waves. Many of them are driven by the solar wind, others are caused by substorms or by instabilities in the magnetosphere and ionosphere. An important member of the various wave modes is the Alfvén wave. This transverse type of wave is guided by the field lines and can transport and deposit energy into certain regions. Depending on their wave length these waves are partly reflected/dissipated at different ionospheric altitudes.

In this talk we will introduce the various kinds of Alfvén waves which are important in the I-M system. Special emphasis will be put on the feature of waves in field line resonance. Recent results from the low-Earth orbiting satellite CHAMP in combination with ground-based observations provide insight in a number of important characteristics. These are among others the driver of the wave, the spatial and temporal structure of the oscillating shell, and the phase rotation through the ionosphere. Observations are compared with theoretical predictions. An only recently detected class of Alfvén waves is excited by plasma instabilities in the low-latitude ionosphere. These waves travel to the conjugate ionosphere and are dissipated/reflected there. The detailed features of this wave is not fully understood.