



Theory of Generation of Alfvénic Non-Propagating Electromagnetic Plasma Structures and Acceleration of Charged Particles in Cosmic Plasmas

Yan Song and Robert Lysak

University of Minnesota, School of Physics and Astronomy, Minneapolis, United States (yan@fields.space.umn.edu)

In Earth's auroral acceleration regions, the nonlinear interaction of incident and reflected Alfvén wave packets can collectively create non-propagating electromagnetic plasma structures, such as the Transverse Alfvénic Double Layer (TA-DL) and Charge Hole (TA-CH). These structures, such as TA-DL, encompass localized strong electrostatic electric fields, nested in low density cavities and surrounded by a local dynamo. Such structures constitute powerful high energy particle accelerators causing auroral particle acceleration and creating both Alfvénic and quasi-static discrete auroras.

Similar electromagnetic plasma structures should also be generated by Alfvénic interaction in other inhomogeneous cosmic plasma regions, and would constitute effective high energy particle accelerators.