Geophysical Research Abstracts
Vol. 14, EGU2012-7244, 2012
EGU General Assembly 2012

Generation of kinetic Alfvén waves by beam-plasma interaction in non-uniform plasma

M. H. Hong (1), Y. Lin (2), and X. Y. Wang (2)

(1) Institute of Geology and Geophysics, Beijing, China (mhhong@mail.iggcas.ac.cn), (2) Physics Department, Auburn University, Auburn, AL 36849-5311, USA

This work reports a novel mechanism of the generation of kinetic Alfvén waves (KAWs) using a two-dimensional hybrid simulation: the KAWs are generated by ion beam-plasma interaction in a nonuniform plasma boundary layer, in which the bulk velocity of the ion beam is assumed to be parallel to the ambient magnetic field. As a result of the beam-plasma interaction, strong shear Alfvén waves as well as fast mode compressional waves are first generated on the side of the boundary layer with a high density and thus a low Alfvén speed, propagating along the background magnetic field. Later, Alfvén waves also form inside the boundary layer with a continuous spectrum. As the perpendicular wave number k⊥ of these unstably excited waves increases with time, large-amplitude, short wavelength KAWs with k⊥» parallel wave number k|| clearly form in the boundary layer. The physics for the generation of KAWs is discussed.