Nonlinear electrostatic instabilities in the solar wind

Gomberoff, L.

It is well known that nonlinear electrostatic instabilities can be triggered in a plasma with streaming ion species in the presence of finite-amplitude Alfvén cyclotron waves. The instability occurs when the phase velocity of linear ion-acoustic waves propagating forward and backward relative to the supporting ion species become equal owing to the presence of the finite-amplitude wave. On the other hand, it has been shown recently that nonlinear ion-acoustic-like instabilities can also occur when the phase velocity of ion-acoustic waves propagating forward relative to the supporting ion species become equal to the phase velocity of ion-acoustic waves propagating backward relative to another supporting ion species. This can occur in a system with one streaming ion species relative to the background plasma and, in a completely different regime, when there is more than one drifting ion species. These instabilities may play a role in the evolution of the fast solar wind.

Copyright 2009 by