

On ion heating by the decay of large amplitude Alfvén waves

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Abstract.

By means of hybrid simulations, we present a study on ion heating by the field-aligned parametric decay of a monochromatic left-hand polarized Alfvén wave. The comparison made among different spatial dimensions proves that the three-dimensional simulation exhibits more efficient heating. Plasma is heated parallel to the mean magnetic field by the damping of the ion acoustic waves while being heated perpendicular by the cyclotron resonance and damping of protons by Alfvén daughter waves. In the solar wind context, the antisunward part of the core component of the proton velocity distributions is controlled by the sunward-propagating waves driven by the parametric decay.