

Study on the competing process between L-mode EMIC instability and mirror instability in the magnetosheath.

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We have been developing a three-dimensional hybrid code. We performed simulations of plasma wave instabilities driven by anisotropic protons as a test of the hybrid code. In a three dimensional model, we assumed cold isotropic protons, cold isotropic helium ions, and hot anisotropic protons. We observed excitation of L-mode electromagnetic ion cyclotron (EMIC) waves, relaxation of the anisotropy of the hot protons, parallel acceleration, and heating of the cold protons and helium ions. With a large temperature anisotropy of ions, we also observed excitation of the mirror mode wave propagating in the oblique angle to the static magnetic field. We performed a parametric analysis on the competing processes between the mirror instability and the EMIC wave instability and the saturation levels of the instabilities.