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Electromagnetic ion-cyclotron instability in low beta plasma with intrinsic Alfven waves

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Intrinsic Alfven waves (IAWs) exist pervasively in the solar-terrestrial plasma, which can preferentially heat newborn ions in the direction perpendicular to the ambient magnetic field via non-resonant interactions when the plasma beta is low. The anisotropized newborn ion populations can excite electromagnetic ion-cyclotron (EMIC) instability. Parametric calculations indicate that the lower the plasma beta is, the higher the growth rate, while the growth rate increases with the number density of newborn ions and the intensity of IAWs. The marginal stable surface in three-dimensional parameter space is also calculated, which provides a qualitative description of parametric conditions for instability. We propose that the coupled effects of non-resonant heating by IAWs and EMIC instability could be an effective mechanism for transferring the energy from low-frequency IAWs to EMIC waves with a frequency below the gyrofrequency of the corresponding ion species. Furthermore, the temperature anisotropy of background ions with the same sense has positive effects on the growth of EMIC waves excited by newborn ions.