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Particle-in-cell simulation study on turbulence driven parametric instability of the Alfven-ion-cyclotron waves HELEN KAANG, WCI-NFRI, CHANG-MO RYU, POSTECH, TONGNYEOL RHEE, NFRI — Nonlinear damping of Alfven-ion-cyclotron (AIC) waves via the parametric instability was investigated by particle-in-cell simulation with low and high beta plasmas. PIC simulation shows same AIC wave damping phenomena regardless of the plasma beta. The excited AIC waves were soon damped via the parametric instabilities; the modulational, decay, and beat instabilities. The ion-acoustic waves and its harmonic mode were excited through the parametric instabilities. The spectrums of ion density and the electromagnetic wave fluctuations showed inverse cascade processes as the results of the continuous excitation of instabilities. These simulation results and the fluid theory showed coherence in low beta plasma, but incoherence in high beta plasma. The fluid theory expects that the AIC waves are unstable for all of the three type parametric instability in low beta plasma, but the only beat instability in high beta plasma. So, this simulation study shows that the plasma kinetic effects which are not considered in the fluid theory lead to the same nonlinear damping phenomena of AIC waves regardless of the plasma beta.

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