

Abstract Submitted  
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**Comparative simulation and theoretical studies of alpha-driven localized cyclotron wave modes in nonuniform magnetic field**<sup>1</sup> Z.H. TSAI, K.R. CHEN, National Cheng Kung University, Tainan, Taiwan, J.Q. DONG, Southwestern Institute of Physics, Chengdu, Sichuan — Particle-In-Cell simulation and gyro-kinetic theory have been developed to study the localized cyclotron wave modes. The localized modes are driven by MeV alpha particles via the excitation of relativistic harmonic ion cyclotron instability in nonuniform magnetic field. The nonuniformity is required to be larger than both the frequency mismatch and the difference between the Lorentz factor and unity for the excitation becoming localized. The high-resolution PIC simulation illuminates the spatial structure with the help of the quiet start numerical technique for reducing the noise level of the simulation. The gyro-kinetic theory derives an integral dispersion relation, which is solved numerically. The eigen-frequency and resultant spatial structure of the localized wave modes as well as the dependence of wave mode characteristics on plasma parameters are comparatively studied in detail.

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