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Particle-in-Cell Simulations of Electron Bernstein Waves

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Banded emissions are frequently observed in planetary magnetospheres. Owing to the intra-harmonic character of the measured frequencies and the fact that they are most often observed near the magnetic equator (suggesting near perpendicular propagation), they are generally attributed to Bernstein waves. A 1D spatial electrostatic Particle-in-Cell (PIC) simulation was performed for a magnetised plasma composed of electrons with a Maxwellian velocity distribution and massive ions. Wave propagation perpendicular to the magnetic field, $k \perp B$, was considered and the resulting dispersion relations revealed a set of harmonics. The lower harmonics were found to be only weakly damped while higher harmonics incurred progressively stronger damping.