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Particle-in-Cell Simulations of Ion Acoustic Waves in Saturn's Magnetosphere

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The kinetic theory of the ion acoustic mode is already well established for a plasma consisting of ions with both cool and hot electrons. The velocities of these particles have been described by Maxwellian distributions. However, the electron velocities in Saturn's magnetosphere were found to be better characterised by a κ-distribution with low values for κ, which describes the enhanced suprathermal tail of the electron distribution. A parameter survey was performed using an electrostatic Particle-in-Cell (PIC) code to investigate the characteristics of ion acoustic waves in Saturn's magnetosphere.