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Scalings for the Alfven-cyclotron Instability: Linear Dispersion Theory and Hybrid Particle-in-Cell Simulations S. PETER GARY, Space Science Institute, XIANGRONG FU, New Mexico Consortium, MISA M. COWEE, DAN WINSKE, Los Alamos National Laboratory, KAIJUN LIU, Auburn University — The Alfvèn-cyclotron instability is driven by an ion temperature anisotropy such that $T_{\perp}/T_{||} > 1$ where $\perp$ and $||$denote directions perpendicular and parallel to a uniform background magnetic field $\mathbf{B}_o$. The theory used here considers a magnetized, homogeneous, collisionless plasma with a magnetospheric-like configuration of two proton components, a more dense, relatively cool, isotropic component and a less dense, relatively hot, anisotropic component which drives the instability. Only wave propagation parallel to $\mathbf{B}_o$ is considered. Using numerical solutions of the full kinetic linear dispersion equation, concise analytic expressions for the scaling of the maximum instability growth rate and the corresponding real frequency are derived as functions of three dimensionless variables: the hot proton temperature anisotropy, the dimensionless hot proton density, and the hot proton $\beta_{||}$. Furthermore, using one-dimensional hybrid particle-in-cell simulations of this same instability, a third relation for the scaling of the maximum amplitude of the fluctuating magnetic field energy density is derived.

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