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Hybrid Simulation of Mode Conversion at the Magnetopause YU LIN, Auburn University, JAY JOHNSON, Princeton Plasma Physics Laboratory, XUEYI WANG, Auburn University — Hybrid simulations are used to investigate how fast-mode compressional waves incident on a magnetopause current layer mode convert both linearly and nonlinearly to short wavelength ($k_\perp \rho_i \sim 1$) kinetic Alfvén waves near the Alfvén resonance surface. The background magnetic fields on both sides of the current layer are parallel and tangential to the magnetopause normal, corresponding to a northward IMF. The simulations are performed in a 2-D xz plane, which is tilted by an angle, θ, relative to the magnetic field. We examine how the mode conversion depends on wave frequency, wave vector, Alfvén velocity profile (particularly the magnetopause width), ion β, T_e/T_i, and incident wave amplitude. Kinetic effects resolve the resonance, and KAWs radiate back to the magnetosheath side. The compressional wave absorption rate is estimated and compared with linear theory. Unlike the prediction from low-frequency theory, KAWs are generated also in cases with $\theta = 0°$, provided $\omega_0 > 0.1\Omega_0$. As the incident wave amplitude is increased several nonlinear wave properties are manifest in the mode conversion process. Harmonics of the driver frequency are generated, and as a result, the mode conversion region and its spectral width are broadened. The nonlinear waves provide a significant momentum transport across the magnetopause and a significant ion heating in the resonant region.

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