

Nonlinear Magnetosonic Wave Propagation in the Magnetosphere

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Using a one-dimensional MHD code of Total Variation Diminishing (TVD) scheme, we perform simulations of propagation of nonlinear magnetosonic waves. A magnetosonic wave is a longitudinal wave propagating perpendicularly to the magnetic field lines, and involves compression and rarefaction of the magnetic field lines and the plasma. We first confirm the theoretical solution of Lee and Kim (2000) for the evolution of nonlinear magnetosonic waves in the homogeneous space. We then perform simulations of magnetosonic waves in the Earth magnetosphere generated by the impact of the solar Coronal Mass Ejection on the magnetopause. We find the minimum perturbation on the magnetopause required for a shock to form in the magnetosphere.