# Theory and Observations of Slow-Mode Solitons in Space Plasmas

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We present a generalized model for one-dimensional magnetosonic structures of arbitrary amplitude, applicable to space plasmas. The model is verified with multipoint measurements on Cluster satellites in the magnetosheath and the boundary layer under conditions of plasma beta (plasma/magnetic pressure) between 0.1-10. We demonstrate good agreement between the model and observations of solitons, magnetic holes, conoidal waves, and "mirror-mode" structures, which represent increases of magnetic field and plasma density 2-5 times the ambient values, or local decreases (holes) by ~50 -90%. Theoretically derived conditions for emergence of nonlinear structures and their propagation properties are also in agreement with in situ measurements in space.

[1] Stasiewicz et al., Magnetosonic solitons detected by the Cluster spacecraft, Phys. Rev. Lett., 90(8), 085002, 2003.
[2] Stasiewicz et al., Properties of fast magnetosonic shocklets at the bow shock, Geophys. Res. Lett. 30(24), 2241, 2003.