

LARGE-AMPLITUDE COHERENT WAVES AND STRUCTURES ON MARS

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Plasma environment of Mars demonstrates a rich variety of waves and coherent structures. Among them are large-amplitude ($\delta B/B \sim 0.3$) upstream waves at the proton gyrofrequency. The waves are often observed in the form of wave packets. Their high coherency and large amplitudes is difficult to explain in terms of a weak turbulence. Another class of the observed upstream waves is steeped magnetosonic waves with dispersive whistler wave trains. Strong low frequency periodic oscillations ($f \sim 0.01 - 0.02$ Hz) of up to an order of magnitude in energy flux of the electrons in the magnetosheath is another example of coherent structures on Mars. This frequency is nearly the same as the typical O^+ gyrofrequency although the oxygen ions if they would be present in the sheath, are not magnetized. Sometimes the whole magnetosheath consists of large amplitude periodic structures. It is not clear whether the wave structures are standing waves or waves propagating past the spacecraft. Oxygen ions escaping the planet also often reveal a similar periodicity suggesting possible periodic pulsations of the whole system. Different mechanisms of such structures will be discussed.