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Structure and dynamics of the solar wind/ionosphere interface on Mars. ASPERA-3 and MARSIS observations om MEX

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The measurements of the local plasma parameters of the ionospheric and solar wind plasmas and the magnetic field strength carried out by the ASPERA-3 and MARSIS experiments onboard Mars Express in the subsolar region of the induced Martian magnetosphere provide us with a first test of the pressure balance across the solar wind/ionosphere interface. The structure of this transition occurs very dynamic and is controlled by the solar wind. In a broad range of the solar wind dynamic pressures, the magnetic field in the boundary layer raises to the values just sufficient to balance the solar wind pressure, and the boundary of the solar wind termination remains approximately at the same altitude. This boundary layer is not a void of plasma but contains the planetary plasma which strongly loads the solar wind. The magnetic field frozen into the electrons is transported across the boundary where solar wind is terminated (MB) and the planetary plasma begins to prevail. The dense ionospheric plasma has a sharp outer boundary (PEB) the position of position coincides or is located a little closer to the planet. Although the number density reaches on the PEB $\sim 10ˆ3$ cm$ˆ{-3}$ the contribution of the ionospheric thermal pressure is rather small and the ionosphere is magnetized. There are also cases when the magnetic field almost does not vary across the MB and PEB. This behavior is probably governed by the IMF orientation. A role of the magnetic crustal sources will be also demonstrated.