ICME-driven Shocks in the Exosphere of Mars: An Analytical Approach

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ABSTRACT

In this work, analytical treatment of ICME-driven shocks propagating towards planet Mars, is carried out. Schamel-Korteweg deVries-Burgers (S-KdVB) equation is derived while taking into account the finite-Larmor radius effect, incorporated through the Braginskii stress tensor. The theoretical modeling is done by considering a particular event observed by MAVEN, when a strong ICME passed Mars on 8th March, 2015, resulting in enhanced solar-wind conditions. The height of the theoretically obtained shock profile matches well with the data obtained from NASA's MAVEN spacecraft observations. Furthermore, the effects of presence of cold electrons on the shock wave characteristics are also investigated.

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