The Interaction of the Martian Ionosphere with the Solar Wind: Current Systems and Diamagnetic Effects. S. A. Ledvina¹ and S. H. Brecht²

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Introduction: Understanding the solar wind/IMF interaction with the Martian atmosphere/ionosphere has been a long standing issue for the space physics community. To fully understand the Martian solar wind interaction, the currents systems around the planet and the crustal magnetic fields must be determined. Current systems map the path of the escaping ions as well as the sources of induced fields within the ionosphere. The term current system means not just the total current, \( J_t = c/4\pi (\mathbf{\nabla} \times \mathbf{B}) \), but also the ion currents individually \( J_s \) (per ion species) and collectively \( J_i \) (total ion current) as well as the electron currents \( J_e \). Because of diamagnetic effects, the paths of these currents need not and probably will not be the same. The current systems and diamagnetic effects around Mars are examined using the output from a hybrid simulation of the Martian solar wind interaction. The similarities and differences of each current system is examined and their implications towards understanding the Martian solar wind interaction will be discussed.

References: