Tail formation and ion escape processes for planets having no intrinsic magnetic field

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On the basis of MHD simulations and observational results, we discuss the interaction between the solar wind and planets like Venus and Mars that have no intrinsic magnetic field. Our discussion is focused on the role of IMF which has a fundamental effect on both the wake structure behind the planet and the total ion escape rate from the planet. If we assume that IMF (directed along the y-axis) is perpendicular to the solar wind flow (directed toward negative x direction), the magnetic field lines draping around the planet tend to impede the flow toward the tail axis in the xy plane, while the flow towards the tail axis is accelerated by the magnetic tension operating in the xz plane. As a result, the balance between the plasma supply rate in the xy plane and that in the xz plane in the wake region significantly controls the total ion escape rate.

In this talk we review our previous results concerning this unique role of the IMF influence, including some recent topics found from our numerical simulations.