Instability-induced momentum transfer at the Martian ionopause

U.V. Amerstorfer[1,2], T. Penz[1,3], N.V. Erkaev[4], H.K. Biernat[1,2,3], H. Lammer[1]

[1] *Space Research Institute, Austrian Academy of Sciences, Schmiedlstrasse 6, A-8042 Graz, Austria*
[2] *Institute for Geophysics, Astrophysics, and Meteorology, University of Graz, Universitätsplatz 5, A-8010 Graz, Austria*
[3] *Institute for Theoretical Physics, University of Graz, Universitätsplatz 5, A-8010 Graz, Austria*
[4] *Institute for Computational Modelling, Russian Academy of Sciences, 660036 Krasnoyarsk 36, Russia*

Pioneer Venus measurements of the velocity distribution in the magnetosheath in the terminator region indicate that a viscous interaction takes place between the solar wind flow and the upper ionosphere leading to a transfer of momentum from the solar wind to the ionosphere. Several spacecraft measurements of the Martian plasma environment can be interpreted in a way that momentum transfer occurs also at Mars. We suggest that the Kelvin-Helmholtz instability, which arises at most regions of the Martian ionopause, is involved in transfering momentum from the solar wind into the ionosphere. Since the instability growth rate and the instability wavelength are largest near the terminator plane, we assume that momentum transfer is most efficient in this region. Inferring the size of the interaction region, we calculate the velocity of the ionospheric particles. Compared with the planetary escape velocity, we conclude that this process is involved in the erosion of the Martian atmosphere.