

Abstract Submitted
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Energetic Neutral Atom Production due to Charge Exchange at Mars ERENA FRIEDRICH, University of Calgary — An energetic neutral atom (ENA) is formed in a charge exchange process where an energetic ion picks up an electron from a neutral particle. Mars, having no notable global intrinsic magnetic field, cannot shield the neutral particles in its atmosphere from the flow of energetic solar wind protons. Consequently, an extensive production of energetic hydrogen atoms (H-ENAs) occurs. In this study a 3D hybrid (kinetic ions, fluid electrons) quasi-neutral particle-in-cell (PIC) plasma simulation is being developed to investigate the production of H-ENAs due to collisions with atomic oxygen (O) and neutral nitrogen molecules (N_2) in the transition region of the Martian near-space environment. In order to better study the interaction between Mars' exosphere and ionosphere, multi-species reactions such as ionization by photons, electron recombination and charge exchange are self-consistently included in the simulation model. The major ions included are exospheric solar wind protons and the planetary O_2^+ , CO_2^+ , O^+ , and N_2^+ ions. The motion of the precipitating particles in the atmosphere is followed, and collisions with atmospheric ions and neutrals (O, CO_2 , N_2) are governed by a Monte Carlo “collision-by-collision” algorithm. What is presented is a “work in progress” as we work towards our goal of computing the flux of escaping H-ENAs due to charge exchange with O and N_2 .

Erena Friedrich
Postdoctoral Research Associate

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