

## **The magnetic and plasma wake of Rhea: results from hybrid plasma simulations**

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Rhea is one of the largest moons of Saturn and maybe one of the few Saturnian moons that can sustain a considerable exosphere. Using reasonable upper limits for the exospheric density and scale height, we examine the interaction of the moon's weak ionosphere with Saturn's magnetospheric plasma using a hybrid plasma simulation code. We find that the modeled exosphere has negligible contribution to the global interaction, and consequently Saturn's magnetospheric plasma is directly absorbed on Rhea's surface. For such a "lunar-type" interaction, the boundary conditions chosen at the obstacle's surface and interior are crucial for the simulation. We solve this problem using a finite conductivity for Rhea's interior and for the plasma vacuum that is formed in its wake. Using this approach, we reproduce many of the expected features in the moon's wake, such as the magnetic field magnitude increase at the wake's center and the rarefaction at the wake boundaries. Compared to the lunar wake, Rhea's wake quickly refills with plasma due to the high plasma temperature at this moon's distance. Our simulation results are expected to be applicable also at Tethys, which is another inert moon of Saturn.