



## **Electron density from active sounding: the effect of the spacecraft wake**

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\*\*This work involves ionospheric electron density measurements via active sounding. A possible source of error in electron density measurements is discussed\*\*

Results from active sounding in the Martian ionosphere—produced by the Langmuir probe and Waves instrument aboard the MAVEN spacecraft—are presented. The electric field spectral measurements obtained immediately after subjecting the plasma to a 3.3 V white noise signal shows, instead of a detectable resonance line associated with the plasma frequency of the ambient plasma, a prominent feature at lower frequencies. The observed resonance line is interpreted to originate from the plasma waves excited within the wake behind the spacecraft. The results, not previously reported in earlier missions, uncover a possible source of error in estimating the electron density via active sounding. These results, furthermore, provide the possibility of investigating the characteristics of the electron wake in a novel manner. By analyzing the frequency of the observed resonance line—along with the electron and ion densities derived from the Langmuir probe's I-V sweeps and the onboard ion instrument, respectively—we infer that the ratio of the electron density inside the spacecraft wake to that of the ambient ionosphere decreases from 0.9 to 0.35 as the spacecraft descends in altitude from 400 km to 185 km.