



Spacecraft antenna system calibration: an improvement of radio data observation and analysis

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The reception properties of spacecraft antenna systems are strongly influenced by currents induced by the incoming electric fields of radio waves on the conducting surfaces of the spacecraft hull. This influence is evident by the deviation of the so called “effective antenna vector” (h_{eff}), representing the electric antenna, from the physical antenna rod. Different methods so far provide knowledge on these effective antenna vectors and further antenna characteristics: (a) Rheometry, (b) Numerical computer simulations, (c) In-flight calibration, and (d) Anechoic chamber measurements.

It will be shown how antenna calibration may be used for a mechanical design enabling an optimum radio wave reception or, in case of strong design constraints, to properly optimize the reception properties. Further, details will be presented on the combined use of the above mentioned methods for the determination of h_{eff} in order to visualize the reception properties over a wide frequency range and to provide an estimate on the inherent methodical inaccuracy. Finally, using Cassini/RPWS and STEREO/WAVES data, the improvement of radio data analysis by consideration of antenna calibration will be addressed.