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Numerical calibration of spacecraft antennas including 2 simple models of space plasma

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Many spacecraft carry sophisticated radio experiments which, designed to increase our understanding of the physics of the waves and plasmas of the solar environment. A key technology of modern radio science is the capability of performing goniopolarimetry, i.e. the reconstruction of the state of polarization and the direction of the radio source from the received data. Goniopolarimetry requires the reception properties of the antennas to be known very accurately. We performed several different methods to calibrate the scientific antennas of various spacecraft. While the traditional technique is to ignore the space plasma which surrounds the spacecraft and the antennas, we are now in a position to use two simple models to consider some effects which can be attributed to the plasma. In the paper, the methods are described and discussed and some results are presented using the recently launched STEREO spacecraft as example.