A Microwave Transmitter for Examining the Effects of Interfering Signal Sources on Interferometric Radiometer Measurements

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European Space Agency's (ESA) Soil Moisture and Ocean Salinity (SMOS) satellite was launched in November 2009, opening a new era in monitoring soil moisture and sea surface salinity. The importance of global and continuous measurements of these parameters in providing information on Earth's climate and its changes has been pointed out by the scientific community in recent years [1]. SMOS payload radiometer called MIRAS (Microwave Imaging Radiometer using Aperture Synthesis) uses aperture synthesis technique new to remote sensing to form an image of the target [2]. The used technique is very effective in producing good quality L-band radiometer data with reasonable ground resolution.

However, the technique is sensitive to artificial or man-made interfering signal sources, and during the first months of operation the SMOS mission has detected a considerable amount of RFI within its supposedly protected frequency band. To ensure good quality of the data, is of great importance to identify the existing sources of RFI (radio frequency interference) and to examine their effects on the measurements.

To examine the effects of RFI in synthetic aperture radiometer measurements an L-band transmitter has been designed and built. Aalto University's airborne L-band aperture synthesis radiometer (HUT-2D) can be tuned to measure the signal from transmitter. Such measurements allow testing and evaluation of the influence of a controllable radiation source with known properties on synthetic aperture radiometers.

This paper describes the construction of the transmitter and its operation in a field campaign. Preliminary results from the measurements are presented and discussed.

References

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