

EARTH OBSERVATION SYMPOSIUM (B1)
Earth Observation Sensors and Technology (3)

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THE SYSTEM DESIGN OF THE PROTOTYPE OF L-BAND APERTURE SYNTHESIS MICROWAVE
RADIOMETER

Abstract

As a new array interferometric microwave radiometer imaging system, aperture synthesis microwave radiometer formed a large physical observation aperture by a thinned array of single small-aperture antennas, which reduced the antenna size and weight, and is placed different spatial location to observe the target for interferometry. At the same spatial resolution, compared with real aperture radiometers, in which brightness temperature (TB) maps are obtained by mechanical scan of a large antenna, aperture synthesis radiometer reduced the collect area of real antenna and obtain the TB image through Fourier synthesis in a snapshot basis. So it can better meet the needs of engineering application and has a strong application prospects. The system design and the structure of the One Dimensional (1D) Prototype of L-band Aperture Synthesis Microwave Radiometer (PLASMR) is introduced first, which contains four parts, the antenna subsystem, the receiver subsystem, the calibration subsystem and the information collection subsystem. The antenna subsystem which contains 8 baselines with 0.5 wavelength minimum space has five waveguide slot antennas with the same structure and performance. The receiver subsystem contains five superheterodyne receivers with the same structure and performance. The calibration subsystem has a noise source which can calibrate the phase imbalance of the five receivers. The information collection subsystem has three functions, information collection, information saving and information processing. After information processing, the image of the target can be obtained. Secondly, the system was verified in lab and the result of interferometric experiment indicates that the phase difference of two channels could be measured accurately. Lastly, the result of nature target imaging is given and the system performs well. The development of the PLASMR establishes engineering application for measuring the soil moisture and sea salty.