

Field of View Calibration of a 114 to 660 GHz Radiometer with a 1.6 Meter Aperture using Near Field Techniques

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Due to be launched in spring of 2004, the Microwave Limb Sounder (MLS) on the NASA AURA satellite will daily map the molecular composition the earth's atmosphere by observing thermal spectral line emission. The MLS scans a limb view of the earth from low earth orbit with radiometer bands centered at 118, 190, 240, 640, and 2500 GHz. The lower 4 frequencies are received through an offset Cassegrain telescope with a 1.6 x 0.8 meter aperture then optically demultiplexed. We employed an NSI 8x8-foot planar scanner with 4-micron RMS planarity to calibrate the fully assembled instrument. Measurements were performed in a thermally controlled instrument assembly and test facility that allowed for time-sharing between beam pattern measurements, electronic assembly and test, and other calibration efforts. We measured relative beam pointing to 10 arc-seconds and side-lobe levels to -70 dB. A description of the microwave sources, optical alignment technique, RF signal processing, and data analysis will be presented.

Keywords: Near-Field, Antenna, JPL, NSI, Microwave Limb Sounder, MLS, EOS, Radiometer, Microwave Interferometry, THz, Sub-millimeter