PRACTICAL IMPLEMENTATION OF PROBE-POSITION CORRECTION IN PLANAR NEAR-FIELD MEASUREMENTS

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The Planar Near-field Technique is a widely used and relatively inexpensive method for characterizing large aperture, high frequency antennas. This technique requires taking amplitude and phase information at accurate and equal point spacing on a plane in the near-field of the antenna under test. The required position accuracy on this plane has been determined to be approximately one-fiftieth wavelength. As frequencies become higher, the accuracy in point spacing position on the planar grid becomes more difficult to achieve and can become a large contributor to the measurement uncertainty budget.

The National Institute of Standards and Technology (NIST)has developed algorithms to correct for position errors [1,2,3] providing the true coordinates of each data point on the measurement plane are known. While the position correction algorithms have been available for several years, methods for obtaining the position coordinates have been tedious and labor intensive. We recently integrated a laser tracking system into our planar near-field (PNF) measurement system that can provide this information. The laser tracker can simultaneously obtain position information in x, y, and z at each point where amplitude and phase data are acquired during a planar near-field antenna measurement. The position uncertainty for the tracker is specified to be 10m/m, which is .001cm at 5 meters. This could provide position correction for measurements up to 500 GHz.

This talk discusses the implementation of a laser-tracking device to provide position information in x, y, and z. Near-field and far-field pattern results are shown for a cassegrain reflector dish antenna at 16 GHZ and a parabolic reflector dish at 35 GHz with and without using position correction algorithms.

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5. Special Session - Microwave Measurements at NIST