LICENSING OPPORTUNITY: RADIO FREQUENCY ANTENNA GAIN MEASURING APPARATUS AND MEASURING GAIN OF AN ANTENNA

DESCRIPTION

Problem

The traditional gain extrapolation technique for calibrating absolute antenna gain requires large laboratory facilities typically several meters long to perform antenna gain measurements and uses many thousands of data points, typically at least 4000 data points, per antenna pair. The problem solution goal was to significantly reduce the number of required data points and reduce the distances that are required while maintaining the same accuracy for antenna gain measurements of +/-0.07 dB.

Invention

This invention is an enhanced three-antenna gain extrapolation technique that allows one to determine absolute antenna gain with significantly fewer data points, as few as 10 data points, and at much closer distances, as much as six times closer than the traditional gain extrapolation technique, yet with the same accuracy of traditional gain extrapolation with an gain uncertainty of around +/-0.07 dB.

BENEFITS

Commercial Application

Absolute antenna gain measurements and calibration for communications, aerospace, remote sensing, wireless, 5G, 6G, defense.

Competitive Advantage

In this enhanced three-antenna gain extrapolation technique, the number of data points is significantly reduce to as few as 10 and the antenna-to-antenna distances can be reduced by a factor of three, and up a factor of six in some cases. As an example, when measuring the gain of a standard-horn-type antenna at an operating frequency of 15 GHz, the advantage would be reduced antenna distanced from 8 meters to as little as 1.3 meters and require as few as 10 data points instead of 7600 per antenna pair. Furthermore, the reduced antenna separation distances also helps reduce measurement errors that occur in the traditional gain extrapolation technique that result from multi-path reflections from the environment. The reduction in the number of data points significantly reduces measurement and processing resources and the reduced distances results in significantly smaller test facilities which translate into advantageous cost saving for facilities construction and operations.

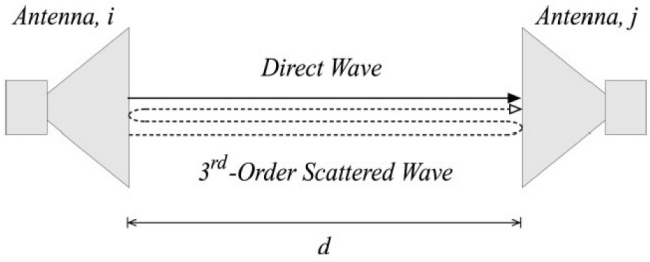

Diagram of general gain extrapolation setup showing the pair of antennas, i and j separated by distance, d. The paths traveled by the direct wave (solid line) and 3rd-order scattered wave (dotted line) are shown.

Contact: licensing@nist.gov

NIST TECHNOLOGY PARTNERSHIPS OFFICE

NIST Technology Partnerships Office
National Institute of Standards and Technology
100 Bureau Drive, Gaithersburg, MD 20899-2200