Letter to the Editor

A Note About the Cover of the August Issue

Regarding the article by Prabhakar Pathak, Giorgio Carluccio, and Matteo Albani, “The Uniform Geometrical Theory of Diffraction and Some of Its Applications,” in the August 2013 issue of the IEEE Antennas & Propagation Magazine (55, 4, August 2013, pp. 41-69), the authors make reference to some data comparing the measured and calculated coupling between a pair of antennas installed on a small aerial platform that is shown on the front cover of the magazine. I wish to point out to your readers that these data came from a comprehensive study conducted by the Naval Research Laboratory to investigate the use of the NEC Basic Scattering Code (NECBSC). This was developed by the ElectroScience Laboratory at The Ohio State University, based on the Uniform Geometrical Theory of Diffraction, to predict the coupling between transmitting and receiving antennas on an aerial platform called FLYRT.

FLYRT, which stands for Flying Radar Target (FLYRT), contained a straight-through signal repeater that received the transmission from a radar, amplified it by many orders of magnitude, and then re-transmitted the signal so that the platform appeared much, much larger to a radar than it would otherwise appear. In this fashion, the unmanned FLYRT can serve as a decoy to attract a radar-guided weapon away from a defending Navy ship or aircraft. Since the repeater decoy receives and transmits simultaneously, the gain of the amplifier (and therefore the apparent size of the radar target) is principally limited by the degree of isolation (i.e., the inverse of coupling) between the receiving and transmitting antennas. Prior to the advent of powerful personal computers and practical full-wave numerical methods, accurate isolation data was usually determined experimentally and only after the platform was designed and constructed, thus limiting the degree of isolation that could be attained. In the early 1990s, NRL investigated the use of the NECBSC to estimate the coupling during the design stage, in which case troublesome structures could be moved or reconfigured to optimize the antenna’s isolation. NRL worked with Ron Marhefka at the ElectroScience Laboratory to improve the accuracy of the near-field coupling calculated using the NECBSC. The accuracy of the NECBSC to estimate antenna coupling on the FLYRT platform was exhaustively studied at NRL, and published in a report entitled “Numerical Modeling and Coupling-Reduction Techniques for the Improvements of Antenna Isolation on Decoy Platforms” by Gary Roan, Richard Muha, and Armando Elia (Report NRL/FR/5754-96-9821, Naval Research Laboratory, Washington, DC 20375-5320, July 26, 1996). The coupling data on the cover of the August 2013 issue was taken from this report.

Although there are currently many computational alternatives, the efficiency of the high-frequency asymptotic methods that are incorporated into computer codes such as NECBSC are still quite useful for the quick estimation and visualization of far-field antenna patterns and near-field antenna coupling on large ships and aircraft. The interested reader is referred to the NRL report that discusses a few of the benefits and limitations of the NECBSC.

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