Improved Antenna with Distributed Resistive Loading for Wideband Performance

Thomas P. Montoya* (1) and Andrew W. Downs (2)
(1) South Dakota School of Mines and Technology, Rapid City, SD 57701
(2) Iowa State University, Ames, IA 50011

This presentation will show results of research on improving a promising wideband antenna with distributed resistive loading (A. W. Downs and T. P. Montoya, *USNC/URSI National Radio Science Meeting*, Charleston, SC, paper 503.2, June 1-5, 2009). As shown in Fig. 1, the antenna used in the original work is comprised of a copper trace running from the feed to the mid-point, and a 610 Ω resistive trace from the mid-point to the open end. From approximately 700 to 1300 MHz, this antenna exhibited a nearly constant input impedance of 200 – j40 Ω (see Fig. 2). The new work seeks to minimize reactance while retaining the wideband performance by adjusting the relative lengths of the conductive and resistive traces and the resistive loading.

For the initial research, a resistively-loaded monopole antenna and comparable conductive antenna were constructed milled on Rogers Corporation, RO4003C™ substrate with a thickness of 0.813 mm, 1/2 oz copper cladding, and a dielectric constant of 3.38. The antennas both have an overall length of approximately 140 mm. The distributed resistive loading was implemented using an nScrypt 600-3Dn-HP direct-write system (http://www.nscrypt.biz/) to deposit Goldstone® 3100 (http://www.methodedevelopment.com/), a carbon-based polymer overprint ink. The experimental measurements were made on a 91.4 × 101.6 cm copper ground plane.

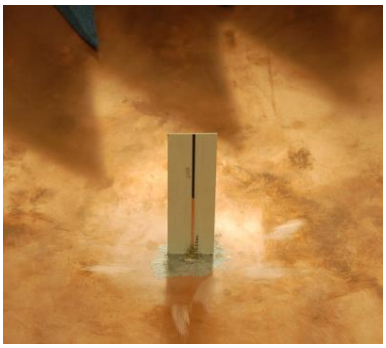

Figure 1. Resistively-loaded monopole antenna.

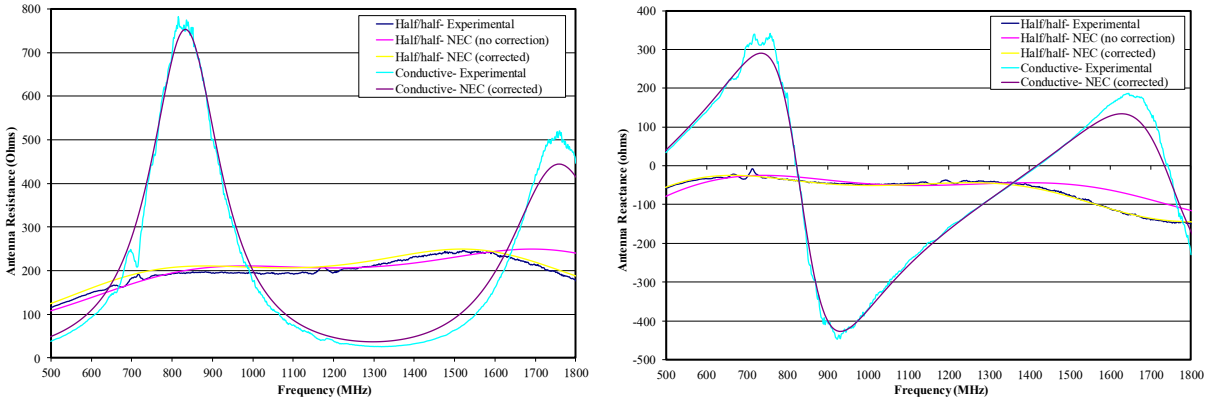

Figure 2. Input resistance and reactance of antennas.