

## DESIGN NOTES

### Antenna Behavior: Size Matters

The August 2005 issue of the IEEE *Antennas & Propagation* Magazine contained an interesting paper by Dr. Steven Best [1]. His paper described the results of an extensive modeling exercise that examined several different configurations of reduced-size antennas—an important family of antennas for portable wireless communications.

In his paper, Best compared a number of folded monopole topologies in self-resonant and impedance matched configurations. Figure 1 illustrates a four-arm structure with additional electrical length added to each arm as a meander line.

Perhaps most interesting is his comparison among variations in the structure of the multiple-arm antenna. The author compared antennas with meander lines, helices and Koch fractal sections. A follow-up set of variations included more complex arrangements of meander lines and a spherical helix.

Quoting from Best's concluding discussion, "When multiple-arm folded monopoles of the same height and occupied volume were made to be resonant at the same frequency, they exhibited similar resonant performance, indicating that the resonant performance properties of these antennas are essentially a function of these physical parameters and are independent of the differences in total wire length and geometry."

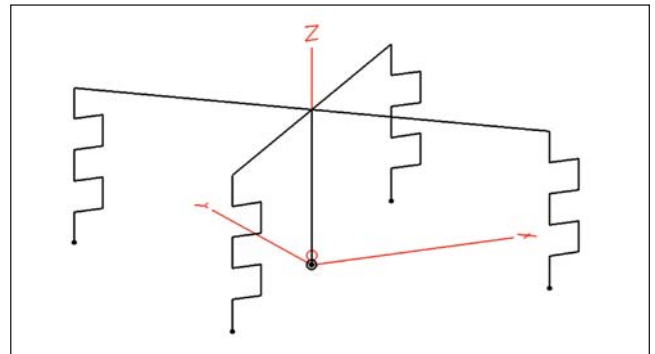


Figure 1 · A four-arm folded monopole with each arm loaded by a meander line.

In short, there is no preferred structure, shape or method of loading—the only means of improving performance is to increase the size. Whether this conclusion can be extended to other antenna structures is a matter for additional studies, but it appears to invalidate some claims that one type of structure is better than another.

1. Steven R. Best, "The Performance Properties of Electrically Small Resonant Multiple-Arm Folded Wire Antennas," *IEEE Antennas & Propagation Magazine*, Vol. 47 No. 4, August 2005.

### IEEE AP-S Call for Awards Deadline Extended

Nominations are solicited for the 2006 AP-S awards. The deadline for nominations has been extended to February 28, 2006. See the IEEE Antennas & Propagation Society Web site for more information: [www.ieeeaps.org](http://www.ieeeaps.org).

### Distinguished Achievement Award

The Distinguished Achievement Award is given to recognize outstanding career achievement by an individual in the field of antennas and propagation.

The criteria considered by the AP-S Awards Committee include: Contributions to fundamental electromagnetic theory and its advanced applications, contributions to the theory of antennas, new methods and approaches to analysis, synthesis, and design of antennas, new methods of analysis of propagation of electromagnetic waves, and other new contributions relevant to the field of antennas and propagation.

### Chen-To Tai Distinguished Educator Award

The Chen-To Tai Distinguished Educator Award is

given to recognize outstanding career achievement by a distinguished educator in the field of antennas and propagation.

Criteria considered include: Excellence in teaching, involvement with and direction of students to prepare them for effective careers in electromagnetics, curriculum development with inclusion of current research, knowledge that reflects the state of the art in courses and authorship of research and course material.

### John Kraus Antenna Award

This award, established by John D. Kraus, honors an individual or team that has made a significant advance in antenna technology.

The criteria considered include: A new or substantially improved method or device for radiating or receiving electromagnetic waves, a new concept for the electromagnetic transmission, reception, or imaging of signals, an innovative use of materials or configuration of structures to achieve better electromagnetic performance, and a design that yields a heretofore unknown capability.