PENNSTATE

THE EMRSSS AREA SEMINAR

(EE 500 GRADUATE COLLOQUIUM)

Fall 2009

You are cordially invited to

The EMRSSS Area Seminar

Entitled

"Investigation of the Null Steering Capability of Yagi-Uda Arrays with Variable Reactive Loads"

By

David F. Kelley

from
Electrical Engineering Department,
Bucknell University

The talk will take place on

October 6, 2009
4:00 pm

At

225 EE West Building

Talk Abstract:

The classic Yagi-Uda array is a static antenna in the sense that its radiation pattern is fixed except for the possibility of mechanical rotation. Although the array achieves very high gain using a simple physical structure, unfortunately the side and back lobe levels can be relatively high, and the nulls can be relatively shallow. However, there are occasions in which it is desirable to steer a deep null toward a direction outside the main beam in order to reduce interference in reception mode or to avoid interfering with a nearby user of the spectrum in transmission mode. If the array has a sufficiently large number of elements, this can be accomplished via adjustment of variable reactive loads connected to one or more of the outermost elements. This paper presents the results of a preliminary study to investigate the null depths that can be achieved using controlled reactive loading and its influence on the gain and input impedance of the array. It is shown that effective null steering can be realized in most directions without significantly reducing the gain or seriously degrading the return loss at the feed point.

Speaker's Bio:

David F. Kelley received the B.S. and M.S. degrees in electrical engineering from Virginia Tech, Blacksburg, in 1986 and 1990, respectively, and the Ph.D. degree in electrical engineering from the Pennsylvania State University, University Park, in 1999.

From 1988 to 1989 he was a consultant for HY-Tech Research Corp., Radford, Virginia, where he developed software to predict electron trajectories past arbitrary charge distributions. From 1989 to 1990, he was with the Advanced Antennas group at Atlantic Aerospace Electronics Corp. (now part of L-3 Communications Titan Group), Greenbelt, Maryland, where he contributed to the development of RCS prediction software and to the simulation of signal detection in the presence of noise. From 1991 to 1993 he was a Senior Engineer with Information Systems Laboratories, Vienna, Virginia, where he worked in the areas of radar clutter mitigation and phased array design. After serving as a Visiting Professor at the Pennsylvania State University from 1999 to 2001, he joined Bucknell University, Lewisburg, Pennsylvania, where he is currently an Associate Professor in the Department of Electrical Engineering. His research interests include phased and parasitic array antennas, reactively controlled arrays, computational electromagnetics, and biologically-inspired optimization algorithms. He is a senior member of the IEEE and of the IEEE's Antennas and Propagation, Microwave Theory and Techniques, and Geoscience and Remote Sensing Societies. He has served on the Education Committee of the Antennas and Propagation Society since 2002 and as Chair of that committee since July 2007.