IEEE Distinguished Lecture

jointly organized by

The IEEE MTT/AP/ED/EMC Turkey Joint Chapter
and
Department of Electrical and Electronics Engineering, Hacettepe University

Design, Analysis, and Applications of Waveguide-Fed Slot Arrays

SPEAKER : Prof. Sembiam R. Rengarajan, Department of Electrical and Computer Engineering California State University, Northridge, CA, USA

DATE : September 6, 2012

TIME : 14:30 - 15:30

PLACE : Mehmet Akif Ersoy Salonu, Beytepe Kampüsü, Hacettepe Üniversitesi

ABSTRACT

Waveguide-fed slot arrays find applications in radar, remote sensing, and communication systems because of their desirable characteristics such as low loss integrated feed and low volume. Accurate electromagnetic analysis and design tools have made it possible to produce such antennas in ‘one pass’ without any hardware iterations and still meet the stringent specifications commonly encountered in modern applications. Because of the all metal construction, slot arrays are ideally suited to withstand severe radiation environment encountered in space applications.

This presentation will start with a review of Elliott’s procedure for designing waveguide fed linear and planar slot arrays. The required input data such as the scattering characteristics of isolated radiating and coupling elements may be obtained, based on techniques such as the method-of-moments (MoM) solution of the pertinent integral equations, or the finite element techniques, e.g., the commercial code HFSS, while the excitation coefficients are determined from a pattern synthesis technique. Stegen-type normalization or an interpolation technique will be used with the computed slot data. External mutual coupling computation in the form of ‘element by element’ model is ideal for small to medium arrays while Floquet series of the infinite array model is suited for large arrays. Different types of feeds and sub-array architectures will be reviewed. Efficient implementation of Elliott’s algorithm with choices for the values of radiating slot admittances and coupling slot impedances will be presented. Analysis techniques such as MoM and HFSS are employed to validate and assess the performance of the arrays. Enhancements to Elliott’s technique that account for higher order mode coupling and the use of full wave method-of-moments technique in improving the design procedure will be illustrated. Some recent examples of practical slot arrays antennas for different applications will be presented. The use of global optimization techniques such as the genetic algorithm in improving the return loss and pattern performance of slot arrays will also be discussed.
BIOGRAPHY

Sembariam R. Rengarajan received the Ph.D. degree in Electrical Engineering from the University of New Brunswick, Canada in 1980. Since then he has been with the department of Electrical and Computer Engineering, California State University, Northridge (CSUN), CA, presently serving as a Professor. He has held visiting professorships at UCLA, Chalmers University of Technology, Sweden, Universidade de Santiago de Compostela, the University of Pretoria, and the Technical University of Denmark and is an Adjunct Professor at the Electromagnetics Academy of Zhejiang University. He has been a consultant to government and industry in the US and abroad. His research interests include application of electromagnetics to antennas, scattering, and passive microwave components. He has contributed to more than 200 journal articles and conference papers.

Dr. Rengarajan is a Fellow of IEEE (1994) and of the Electromagnetics Academy. He has served as an Associate Editor of the IEEE Transactions on Antennas and Propagation (2000-03) and as the Chair of the Education Committee of the IEEE Antennas and Propagation Society (APS). He received the Preeminent Scholarly Publication Award from CSUN in 2005, CSUN Research Fellow Award in 2010, a Distinguished Engineering Educator of the Year Award from the Engineers' Council of California in 1995, and 20 awards from the National Aeronautics and Space Administration for his innovative research and technical contributions. He is the Chair of the Commission on Waves and Fields of the United States National Committee of URSI during 2012-14 and is a Distinguished Lecturer for the IEEE APS during 2011-13.

REMARKS

- Refreshment will be provided.
- There is no fee to attend.
- Please contact Prof. Dr. Birsen Saka no later than Wednesday, September 5 to reserve your seat at this seminar.

Prof. Dr. Birsen Saka
Email: birsen@ee.hacettepe.edu.tr
Phone: (312) 297 7000