3D Frequency Selective Structures: Opportunities and Challenges

Zhongxiang Shen
Associate Professor, Nanyang Technological University, Singapore

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Abstract: Conventional frequency selective surface consists of a two-dimensional (2-D) periodic array of unit-cells, which are either printed on a dielectric substrate or etched out of a conductive surface. These simple 2-D surfaces suffer from poor frequency selectivity and unstable response under different incident angles. Recently, an innovative concept of three-dimensional (3D) frequency selective structure (FSS) was proposed to alleviate the disadvantages of traditional frequency-selective surfaces. The new type of 3-D frequency selective structure is composed of a 2D periodic array of vertically placed microstrip lines, which is very promising for the realization of compact high-performance FSSs. This talk will introduce the proposed 3-D frequency selective structure. Mode-matching formulation for analyzing the structure will be briefly presented and equivalent circuit model will be employed to explain the operating principle of these three-dimensional FSSs. A number of design examples will be presented to demonstrate the high performance filtering response of 3D FSSs. Possible research topics for further investigation are suggested and existing challenges are also mentioned at the end of the talk.

Bio: Zhongxiang Shen received the B. Eng. degree from the University of Electronic Science and Technology of China, Chengdu, China, in 1987, the M. S. degree from Southeast University, Nanjing, China, in 1990, and the PhD degree from the University of Waterloo, Waterloo, Ontario, Canada, in 1997, all in electrical engineering.

From 1990 to 1994, he was with Nanjing University of Aeronautics and Astronautics, China. He was with Com Dev Ltd., Cambridge, Canada, as an Advanced Member of Technical Staff in 1997. He spent six months each in 1998, first with the Gordon McKay Laboratory, Harvard University, Cambridge, MA, and then with the Radiation Laboratory, the University of Michigan, Ann Arbor, MI, as a Postdoctoral Fellow. In Jan. 1999, he joined Nanyang Technological University, Singapore, as an assistant professor. He has been an associate professor in the School of Electrical and Electronic Engineering, NTU, since Jan. 2004. Dr. Shen served as Chair of the IEEE MTT/AP Singapore Chapter in 2009. From Jan. 2010 to Aug. 2014, he was the Chair of IEEE AP-S Chapter Activities Committee. He is currently the Secretary of IEEE AP-S.

His research interests include design of small and planar antennas for various wireless communication systems, analysis and design of frequency-selective structures, hybrid numerical techniques for modeling RF/microwave components and antennas. He has authored or co-authored more than 150 journal papers (among them 90 were published in IEEE Journals) and presented more than 140 conference papers.

Contact Information: Dr. Asimina Kiourti, Senior Research Associate, Dept. of ECE, OSU, IEEE AP/MTT Columbus Chapter Secretary/Treasurer, kiourti.1@osu.edu