

Seminar On

Low-Profile Patch Antennas with Improved Radiation Performances

By

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Lau Ming Wai Academic Building, City University of Hong Kong

Abstract

This talk mainly introduces the wideband patch antennas under multimode resonance, high-functionality patch antennas with loading of shorting pins, and wideband circularly-polarized (CP) patch antennas based on magnitude and phase synthesis method of filters. Firstly, by means of proper excitation and perturbation approaches, multiple radiation modes of a single patch antenna unit are moved together to form wide impedance bandwidth under low profile. In this research, slot coupled and differential feeding schemes are employed, while SIR structure and loadings of shorting pins and slots are utilized to allocate the resonant frequencies of TM₁₀ and TM₃₀ modes in proximity to each other, which significantly widening impedance bandwidth. Secondly, the loading effect of shorting pins is further developed to improve the impedance and radiation performance of patch antennas. On the one hand, the shorting effect of pins changes the distributions of current and electric field of patch antenna, which is used to achieve direct matching with high input impedance and maintain low cross-polarization. On the other hand, loading of shorting pins increases the resonant frequency of dominant mode of patch antenna, resulting in controllable electrical size of patch, thus achieving high gain and wide 3-dB axial-ratio beamwidth simultaneously. At last, by feeding the patch radiator with resonators, the antenna is equivalently regarded as bandpass filter networks, and wideband AR response can be obtained via synthesis method of filters. In this aspect, both magnitude and phase responses are simultaneously considered, and wideband CP patch antennas with two and three minima in the AR response are realized with the proposed method.

Biography

Prof. Lei Zhu (祝雷) received the B.Eng. and M.Eng. Degrees in Radio Engineering from Nanjing Institute of Technology (now Southeast University), Nanjing, China, in 1985 and 1988, respectively, and the Ph.D. Degree in Electronic Engineering from the University of Electro-Communications, Tokyo, Japan, in 1993. He joined the Faculty of Science and Technology, University of Macau in August 2013, where he has been a Distinguished Professor since Dec. 2016. So far, he has published more than 310 journal papers and about 150 conference papers. His research interests include microwave circuits, guided-wave periodic structures, planar antennas, and computational electromagnetic techniques. Prof. Zhu was the Associate Editors for IEEE Transactions on Microwave Theory and Techniques (2010-2013) and IEEE Microwave and Wireless Components Letters (2006-2012). He served as the members of IEEE MTT-S Fellow Evaluation Committee (2013-2015), and IEEE AP-S Fellows Committee (2015-2017). He was a General Chair of 2008 IEEE MTT-S International Microwave Workshop Series on the Art of Miniaturizing RF and Microwave Passive Components, Chengdu, China. He was the recipient of the 1997 Asia-Pacific Microwave Prize Award. He is the Fellow of IEEE.

*** ALL ARE WELCOME ***

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