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Editorial

Broadband Antennas and Antenna Arrays

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As a key component of any wireless system, antenna plays an important role and must adapt to the rapid demand for more functionalities and high data rate of communication systems. As a result, increasing the operating bandwidth of antennas and arrays has become a research topic gaining growing attention in the past decade. Wideband or multiband antennas and arrays are also finding numerous applications in radar and sensing systems.

Broadband antennas have been studied for several decades; they may be under a different name of frequency-independent antennas. Typical broadband antennas include log-periodic antenna, spiral antenna, and complementary antennas. However, most of these existing broadband antennas are nonplanar and may not be directly mounted on a metallic platform. On the other hand, many new technologies emerged in the recent years, such as system in chip and system on package that may be based on LTCC, Si, GaAs, and other substrates and used in various radar, communication, and sensor systems. For such emerging technologies, planar antennas and antennas in package are preferred solutions for realizing a compact radio system. However, broadband antennas required by these emerging systems cannot be implemented using log-periodic antenna or spiral antenna. New antenna structures and design methodologies must be proposed to achieve broadband operation with a compact size. Furthermore, different radio systems may have different specifications, which may employ different antennas and arrays to meet the system requirements.

This special issue provides a platform for researchers around the world to present their research findings and achievements in the design of broadband antennas or broadband antenna arrays. For this issue 18 manuscripts were received, and after the rigorous review process 9 papers have been recommended for publication.

Enhancing the bandwidth of phased arrays is an interesting and important topic and two papers are concerned with this bandwidth issue. J. Xu and W. Dou's paper adopts a novel printed dipole to achieve broadband performance, while D. Sun et al.'s paper studies conformal phased array on a spherical surface.

The radiation efficiency of multifeed circularly polarized antenna array will deteriorate due to the mutual coupling between different feeds. Z. Xing et al.'s paper deals with the problem of how to improve the radiation efficiency of such multifeed antenna arrays.

Microstrip integrated balun-fed printed dipole antenna is widely used in communication and radar systems due to its suitability for integration with other circuit modules. However, its cross-polarization levels (about −20 dB) may be high for some application. H. Jingjian et al.'s paper describes a method to suppress the cross-polarization to −35 dB.

Microstrip patch antenna array has been extensively studied for many years because of its many attractive features. It is well known that the bandwidth of microstrip antennas is inherently narrow. Much effort has been made to increase the bandwidth of microstrip arrays in the past. X. Ren et al.'s paper employs Giuseppe Peano fractal antenna array to improve the bandwidth. And A. Singh and S. Singh's paper describes another approach based on aperture coupled inverted U-slot patch antenna with small steps at the edges.

A new agile antenna system named as electromagnetic band gap (EBG) matrix antenna is presented in H. Abou Taam et al.'s paper. EBG antennas can potentially enhance the directivity of a single source and realize beam-forming

capability, dual-band operation, bandwidth enhancement, and polarization diversity.

New antenna designs suitable for WLANs are gaining growing attention because the limited space available for the antenna poses a trade-off between bandwidth and radiation efficiency of the antenna. W.-S. Kim et al.'s paper presents a low-profile multiband antenna suitable for WLANs, using a chip inductor and tuning stub for broadband impedance matching.

S.-H. Ting et al.'s paper describes a novel loop antenna exhibiting broadband characteristics suitable for wireless ocular physiological monitoring systems. The proposed antenna may also be potentially useful for soft contact lens and communications within MEMS.

For the topic of broadband antennas and antenna arrays, though this special issue provides only a small portion of relevant research work, it will definitely benefit researchers working on similar topics. It is our hope that the proposed antenna structures and the addressed issues may inspire more researchers to work on these problems and come up with new and innovative ideas to design better antennas and arrays with wider bandwidth in the near future.

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