



ANTENNAS FOR MODERN COMMUNICATIONS

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Time: 13:30-15:00, Monday, August 5, 2019
Location: Room JLT, Jennison Building
Chair: Professor Steven Gao

Abstract

With rapid growth in modern communication systems, counter circularly polarized (CP) antennas, reconfigurable antennas, and metaplate antennas have been receiving considerable attention. This talk presents recent progress in these antennas, and is composed of three chapters. Chapter 1 describes a metaline-based counter CP antenna, which radiates a left-handed CP wave across a specific frequency band and a right-handed CP wave across a different frequency band, without changing the feed point. This dual-band counter CP antenna is suitable for use in, for example, satellite communications. Chapter 2 investigates multi-beam reconfigurable antennas. Each antenna is composed of a single fed disc backed by a ground plane and multiple parasitic elements surrounding the disc. Analysis reveals reconfigurability of the antenna characteristics, including the radiation pattern, input impedance, and gain, when the connection state (open or closed circuit with respect to the ground plane) of the bottom end of the parasitic elements is changed. Chapter 3 presents high-gain antennas with a beam that can be tilted in specific directions. It is emphasized that these antennas do not use phase shifters; each antenna is composed of a single radiation source and N ($= 1, 2, 3$) inhomogeneous loop-based metaplates, which are placed above the radiation source. The mechanism for forming a tilted beam is explained and radiation beams with a tilt angle of 30 and 60 degrees from the zenith are demonstrated.



Professor Hisamatsu Nakano has been with Hosei University since 1973, where he is now a professor emeritus and a special-appointment researcher at the Electromagnetic Wave Engineering Research Institute attached to the graduate school of the same university. His research topics include numerical methods for low- and high-frequency antennas and optical waveguides. He has published over 320 articles in major journals and 11 books/book-chapters, including “Low-profile Natural and Metamaterial Antennas (IEEE Press, Wiley, 2017).” His significant contributions are the development of five integral equations for line antennas and the realization of numerous wideband antennas, including curl, spiral, helical, and cross-wire antennas. His other accomplishments include

antennas for GPS, personal handy phone, space radio, electronic toll collection, RFID, UWB, and radar. Prof. Nakano received the “H. A. Wheeler Award” in 1994, “Chen-To Tai Distinguished Educator Award” in 2006, and “Distinguished Achievement Award” in 2016, all from IEEE Antennas and Propagation Society. He was also the recipient of “The Prize for Science and Technology” from Japan’s Minister of Education, Culture, and Sports, in 2010. Prof. Nakano is an Associate Editor of several journals and magazines, such as Electromagnetics and the IEEE Antennas and Propagation Magazine.

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