

Seminar On

Dispersive Material Antennas

Professor Yi Huang

The University of Liverpool, The United Kingdom

Date : 10 January 2025 (Friday)
Time : 11:00 am – 12:00 nn
Venue : Room 15-202, 15/F, State Key Laboratory of Terahertz and Millimeter Waves,
Lau Ming Wai Academic Building, City University of Hong Kong

Abstract

Antennas are an essential device of a radio system. How to make them wideband but with a compact side has been a tough question for decades. In this talk, we are going to explore a new method to solve such a problem – using a dispersive material.

A dispersive material has a refractive index (the square root of permittivity) varying with the frequency. Different colours of light will be refracted, or bent, by different amounts when they pass through such a material. It is commonly used in optics, especially in lenses and prisms, to control the dispersion of light. In telecommunications, the dispersion properties of materials can also impact signal quality and data transmission rates, which is an important consideration in fibre optic communication systems. For RF/microwave antennas, dielectric materials have been used to make dielectric resonate antennas (DRAs), where non-dispersive materials (such as ceramics) are utilized to ensure stable performance over the operational frequency. However dispersive materials have not been employed for antennas since this topic has not been properly studied before and their suitability has been a question. If the permittivity of a composite material could be configured as a special function of frequency (a dispersive material), such as the permittivity inversely proportional to the frequency square – this means that the wavelength of an EM wave in the material becomes a constant! We can therefore make antennas (such as a half-wave antenna) to be of an ultrawide bandwidth but compact in size which is extremely attractive. We are going to share the latest development of this work at Liverpool (the success and problems) and hopefully, you will get some inspiration to work in this new area.

Biography



Professor Yi Huang received DPhil in Communications from the University of Oxford, UK in 1994. He has been conducting research in the areas of wireless communications, applied electromagnetics, radar, and antennas since 1987. His experience includes 3 years spent with NRIET (China) as a Radar Engineer and various periods with the Universities of Birmingham, Oxford, and Essex in the UK as a member of research staff. He worked as a Research Fellow at British Telecom Labs in 1994 and then joined the Department of Electrical Engineering & Electronics, the University of Liverpool, UK as a Faculty in 1995, where he is now a full *Professor in Wireless Engineering, the Head of High Frequency Engineering Group*. Dr Huang has published over 500 refereed papers in leading international journals and conference proceedings and authored books on *Antennas: from Theory to Practice* (John Wiley, 2008, and 2021) and *Reverberation Chambers* (Wiley 2016, and 2019). He has received over 10 awards (e.g. the IET Premium Award 2022 for Best Paper, EuCAP2023 Best Antenna Paper, the IET Innovation Award 2018, and BAE Systems Chairman's Award 2017) and many research grants from research councils, government agencies, charities, the EU, and industry, acted as a consultant to various companies, and served on a number of national and international technical committees (such as the IET, EPSRC, European ACE, COST-IC0603, and COST-IC1102, and EurAAP) and been an Editor, Associate Editor or Guest Editor of four of international journals (including IEEE AWPL 2016-2022). He has been a keynote/invited speaker and organiser of many international conferences and workshops (e.g. EuCAP2018/2024, IEEE iWAT, WiCom, and LAPC). He was the Editor-in-Chief of *Wireless Engineering and Technology*, Associate Editor of *IEEE AWPL*, and the UK/Ireland Delegate to EurAAP. He is now an Associate Editor of *IEEE Trans on Antennas and Propagation*, a College member of EPSRC, a member of the IEEE APS New Technology Directions Committee, a Distinguished Lecturer of IEEE APS, and a Fellow of IEEE.

*** ALL ARE WELCOME ***

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