Department of Electrical Engineering
香港城市大學
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IEEE (HK) Section
AP/MTT

Virtual Seminar on

Huygens' Metasurfaces for Controlling Electromagnetic Waves

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Date: July 23, 2020
Time: 9:00 am to 10:00 am
Venue: Online
Registration link: https://events.vtools.ieee.org/event/register/235428

Abstract

We will describe the concept of the Huygens' metasurface which comprises co-located electric and magnetic dipoles forming an electrically dense array of Huygens' sources or scatterers. These engineered surfaces can be designed to control electromagnetic waves at will. Both passive and active Huygens' metasurfaces can be envisioned. Unlike traditional antenna transmitarrays, Huygens' metasurfaces can be made sub-wavelength thin and devoid of spurious Floquet modes, while preserving excellent matching characteristics. Huygens' metasurfaces can be used to manipulate the phase, magnitude and polarization of incident electromagnetic waves, including those from nearby elementary antennas, for a variety of applications. For example, Huygens' omega bi-anisotropic metasurfaces enable wave refraction at extreme angles without any reflections. They also allowed the demonstration of generalized flat reflectors having arbitrary angles of incidence and reflection and with 100% theoretical efficiency. Examples of Huygens' metasurface applications include 'perfect' wavefront refraction, focusing and lensing, polarization control including chirality, active cloaking, high-aperture efficiency/low-profile antennas, and antenna aperture beamforming with simultaneous magnitude and phase control.

Biography

George V. Eleftheriades earned his Ph.D. and M.S.E.E. degrees in Electrical Engineering from the University of Michigan, Ann Arbor, in 1993 and 1989 respectively. Currently he is a Professor at the Department of Electrical and Computer Engineering at the University of Toronto where he holds the Velma M. Rogers Graham Endowed Chair in Engineering. Prof. Eleftheriades introduced some of the early concepts in using transmission lines to realize negative-index metamaterials. Together with his graduate students he has produced the first experimental demonstration of focusing beyond the diffraction limit with a Veselago-Pendry lens and invented a number of novel and practical antenna/microwave/optical devices. Prof. Eleftheriades is the recipient of the 2008 IEEE Kiyo Tomiyasu Technical Field Award. He also received the 2015 John Kraus Antenna Award and the 2019 Distinguished Achievement Award from the IEEE Antennas and Propagation Society. He is an IEEE Fellow and a Fellow of the Royal Society of Canada. He has been the general chair of the 2010 IEEE Intl. Symposium on Antennas and Propagation and CNC/USNC/URSI Radio Science Meeting in Toronto and the TPC co-chair of the 2020 IEEE/URSI Intl. Symposium on Antennas and Propagation (virtual).

***** ALL ARE WELCOME *****

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