IEEE AP-MTT Columbus Chapter Presents:

Transmission-Line Metamaterials & Related Structures: Fundamentals & Applications

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Abstract: Over the past few years there has been intense interest in artificial materials with unusual electromagnetic properties that cannot be found in nature. Therefore these materials are referred to as “metamaterials” (meta means beyond in Greek). The most representative metamaterial is characterized by a negative index of refraction. The feasibility of media which simultaneously exhibit negative permittivity and negative permeability, hence a negative refractive index, has been proposed in the sixties. However, it is only recently that people invented ways to realize them. In this seminar, the fundamentals of transmission-line metamaterials (MTMs) will be presented and related structures such as the Huygens' metasurface will be introduced. Subsequently, a number of applications of transmission-line metamaterials and related structures will be presented in the microwave and optical regimes. These include super-lensing in free space, multi-band/broadband passive and active RF/microwave components, active/non-Foster microwave components and antennas, passive and active cloaking, the far-field optical super-microscope, ultrathin optical hetero-junction lenses and optical leaky-wave antennas.

Bio: 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 in the Department of Electrical and Computer Engineering at the University of Toronto where he holds the Canada Research/Velma M. Rogers Graham Chair in Engineering. Eleftheriades introduced the concept of utilizing transmission lines to realize negative-index metamaterials in 2002. 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 devices. Eleftheriades is the recipient of the 2008 IEEE Kiyo Tomiyasu Technical Field Award. 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 which was held in Toronto, Canada July 11-17, 2010. Together with his graduate students he co-authored several award-winning papers including the 2010 IEEE Microwave and Wireless Components Best Paper Award, and twice (2008 &2012) the RWP King Best Paper Award from the IEEE Transactions on Antennas and Propagation, as well as the 2014 Piergiorgio Uslenghi Best Paper Award from the IEEE Antennas and Wireless Propagation Letters. His papers have been cited more than 10,000 times and has an h-index of 47 (Google Scholar).