AWPL Special Cluster 2018: "Magnet-less Nonreciprocity in Electromagnetics"

Electromagnetic nonreciprocity is a widely used concept in electronics and photonics, where it loosely refers to components and structures that distinctly process waves and signals depending on their propagation direction. A nonreciprocal system may be generally defined as one whose time-reversal symmetry is broken by some mechanism, and is hence time-reversal asymmetric. In general, a linear, time-invariant medium is nonreciprocal if it violates the Lorentz reciprocity theorem, due to the presence of an external bias that is odd under time reversal. The corresponding scattering matrix is nonsymmetric. Nonlinear structures, for which a scattering matrix cannot be straightforwardly defined, may be nonreciprocal even in the absence of bias, as they may be "self-biased", and hence symmetry broken, via the propagation of the signal itself in the presence of asymmetry.

The incorporation of ferromagnetic materials in linear and time-invariant structures has been the dominant technology in nonreciprocal systems since the 1950s, first at microwave frequencies and later also at optical frequencies, where myriads of isolators, circulators, gyrators, nonreciprocal phase shifters, polarizers, and other components, have been developed. This technology still represents the bulk of today's nonreciprocal systems across the entire electromagnetic spectrum. However, conventional ferromagnetic material technology suffers from some fundamental issues, such as the requirement of a magnet, related bulkiness and heavy weight, frequency range restrictions and incompatibility with integrated circuit technology.

Due to these issues, approaches to nonreciprocity that do not require an external magnetic bias have been explored and, thanks to recent improvements in the related technologies, have emerged as an important research topic in the last few years. These approaches include self-biased ferromagnetic nanomaterials, magnet-less transistor-loaded metamaterials, space-time modulated waveguides, and ingenious asymmetric nonlinear structures. Due to their unique potential, these methods to induce nonreciprocity have recently become a hot topic both in the engineering and physics communities.

We are therefore pleased to announce this special cluster of the IEEE Antennas and Wireless Propagation Letters (AWPL) on "Magnet-less Nonreciprocity in Electromagnetics", which is intended to represent a broad perspective of this area, covering both theory and technology and spanning across the entire electromagnetic spectrum from radio to optical frequencies. The prospective topics of this cluster include (but are not limited to):

- Theoretical modeling and conceptual understanding of magnet-less approaches to nonreciprocity,
- Radio-frequency designs and implementations of magnet-less nonreciprocal devices and systems,
- Nanophotonic designs and implementations of magnet-less non-reciprocal devices and systems.

The guest editors of this special cluster are:

- Prof. Christophe Caloz, Polytechnique Montréal, Canada. Email : christophe.caloz@polymtl.ca
- Prof. Andrea Alù, the University of Texas at Austin, U.S.A. Email: alu@mail.utexas.edu

Potential authors are encouraged to contact the Guest Editors for any questions regarding the suitability of their potential contribution to this special cluster.

Papers should be prepared following the same submission instructions as for regular IEEE AWPL manuscripts (four-pages maximum, double-column, IEEE format), available via the Information for Authors website (http://awpl.eleceng.adelaide.edu.au/authors.htm). The authors should indicate in the cover letter to the Editor-in-Chief that the manuscript is being submitted in response to the Call for Papers for the focused cluster on "Magnet-less Nonreciprocity in Electromagnetics". Prospective authors should refer to the timeline below for key dates. The publication charges will be at the standard rates for AWPL – page one is free, each subsequent page is $200.

Key dates:

- Submission deadline: March 31, 2018
- First decision: May 15, 2018
- Revised manuscript deadline: June 15, 2018
- Final decision: July 30, 2018
- Final manuscripts due by: September 1, 2018
- Online publication: shortly after final manuscript submission
- Cluster publication: November 2018 issue of AWPL