Abstract

Artificial magnetic materials (AMMs) are a type of metamaterials which are engineered to exhibit desirable magnetic properties not found in nature. Artificial magnetic materials have proliferating applications in microwave and optical frequency region. Such applications include inversely refracting the light beam, invisibility cloaking, ultra miniaturizing and frequency bandwidth enhancing low profile antennas, planar superlensing, super-sensitive sensing, decoupling proximal high profile antennas, and enhancing solar cells efficiency, among others. AMMs have unique enabling features that allow for these important applications.

In this talk, a fundamental limitation of AMMs based on a circuit model describing the behaviour of AMMs is introduced. Then, a novel design methodology based on an introduced analytical formulation for artificial magnetic material with desired properties is implemented. The methodology can be exploited by those who are fabricating metamaterials for academic research and even those who exploit metamaterials for industrial applications. Indeed, the procedure can be followed by designers with limited knowledge in the field. The proposed methodology enhances the applicability of artificial magnetic materials. Thereafter, three candidate structures for realizing a desired AMM based on the proposed methodology are introduced. Finally, the proposed structures are used in design of the ground plane in a microstrip stop-band filter, and as the substrate in design of a miniaturized patch antenna.

Biography

Ali Kabiri received his B.E. degree in Electrical and Communication Engineering from Sharif University of Technology, Iran (2000), the M.S. degree in Theoretical Physics (2002). Ali Kabiri pursued his higher education after 4 years professional work in industry at Samsung digital display manufacturing plant, Iransection. He also served as a sectional manager for Samsung IT product service center in Iran. Ali Kabiri received his PhD degree in Electromagnetics and RF design from the University of Waterloo, Canada (2010), and currently he is a postdoctoral research fellow at the University of Quebec. His current research interests include the Metamaterial and its applications in radio and millimetre frequencies, plasmonic and optical magnetism. He has authored or co-authored over 28 journal and conference papers. He also received the 2010 NSERC postdoctoral fellowship. During his PhD study, Dr. Kabiri has received several provincial and institutional awards and scholarships, including Ontario Graduate Scholarship (OGS) (2007-2009), and Faculty of Engineering Scholarship for four years. He also received a certificate in University Teaching from Centre for Teaching Excellence during his PhD. He is currently serving as the Vice-Chair of IEEE Ottawa AP/MTT Chapter.