

Metamaterial analog computing

By

Dr. Alexandre Silva

Samsung Research Institute Brazil (SRBR)

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Host: Asst. Prof. Cesare Soci



Abstract

We will introduce the concept of metamaterial analog computing, based on suitably designed metamaterial blocks that can perform mathematical operations (such as spatial differentiation, integration, or convolution) on the profile of an impinging wave as it propagates through these blocks. Two approaches are presented to achieve such functionality: a subwavelength structured metascreens combined with graded-index waveguides and multilayered slabs designed to achieve a desired spatial Green's function. Both techniques offer the possibility of miniaturized, potentially integrable, wave-based computing systems that are thinner than conventional lens-based optical signal and data processors by several orders of magnitude.

Short Biography

Alexandre Silva received his Bachelor degree in Computer Science from the Academic Center of Pará - CESUPA (Brazil) in 1998 and his Electrical Engineering bachelor degree from the Federal University of Pará - UFPA (Brazil) in 2001. He received his MSc and the PhD degrees in Electrical Engineering from the University of Campinas – UNICAMP (Brazil) in 2004 and 2011, respectively, where he was part of the group that has designed the first totally Brazilian built radar. He has worked as a postdoc associate in professor Nader Engheta's group at the University of Pennsylvania - Upenn (USA). Since 2013 he is a researcher at Samsung Research Institute Brazil (SRBR). He is an IEEE and OSA member with research interests in metamaterials, Epsilon-Near-Zero materials, photonics, plasmonics, and antennas