

Guidelines for Student Reports

PIXEL-BASED METAMATERIAL DESIGN

F. Dolci

Abstract

In metamaterial design based on Transformation Optics, the output is an analytical representation of spatial variation of material properties (permittivity and permeability). The straightforward approach toward physical realization of such materials is to make a stair case approximation of the analytical results. This poses a practical challenge because there are only limited number of materials available each having a fixed set of properties. In the view of practical realization the objective of this activity is to use material by design methodology to make pixel level specification by selecting an actual material from a library of available materials. This introduces tradeoff between practical realizability and the performance of the overall material. The project involves integrating (an existing) Transformation Optics based metamaterial design tool with a system by design loop. The design approach will be tested for applications of linear array miniaturization using metamaterial lenses, and array performance enhancement using conformal metamaterial lenses.

Reference Bibliography: Evolutionary Optimization [1]-[2]; Metamaterial [3]-[9]; System-by-Design [10]-[11].

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Supervisors: Prof. Andrea Massa, Dr. Lorenza Tenuti.*