Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Light propagation in synthetic pseudo-passive media with balanced gain and loss[1] ALI BASIRI, TSAMPIKOS KOTTOS, Wesleyan Univ, ILYA VITEBSKIY, The Air Force Research Laboratory, Sensors Directorate —
Optical materials exhibiting exotic values of permittivity ε and/or permeability μ are often prohibitively lossy. This is especially true for composite optical metamaterials. A natural solution to the problem is to add a gain component and, thereby, to offset the losses. There are two different ways to do so. The first one involves a photonic structure composed of judiciously arranged loss and gain components. A well-known example of such balanced loss-gain structures is the so-called PT symmetric photonic crystals. An alternative approach is to compensate the losses with gain while preserving uniformity of the medium. Here we consider this second case where both constituents are complex such that $\varepsilon = \varepsilon$'+i$\varepsilon$"; $\mu = \rho^2\varepsilon^*$ with ρ being real. In this case the material would have a uniform real refractive index n= $\sqrt{\varepsilon\mu}$ =n*. We demonstrate that this type of pseudo-passive synthetic structures show novel transport characteristics uncommon to regular lossless structures.

[1]AFOSR MURI grant FA9550-14-1-0037 and NSF DMR-1306984

Ali Basiri
Wesleyan Univ

Date submitted: 09 Nov 2014 Electronic form version 1.4