Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Phase Effects of Plasmon Polaritons in Hyperbolic Metamaterials

CYRUS VANDREVALA, YULI LYANDA-GELLER, SABRE KAIS, Purdue Univ

— Metamaterials are artificial materials engineered to have properties that are generally not found in nature. They get their qualities from their structure rather than their chemical composition. Hyperbolic metamaterials are a subclass of metamaterials that have a hyperboloid-shaped dispersion curve. Due to this unique dispersion relation, light travels only in specific directions within the material for certain values of the wave vector. Although the exact mechanism that allows light to propagate through a hyperbolic metamaterial is still not exactly known, it is thought that surface plasmon polaritons at the interfaces between each metal and dielectric layer support the transmission of light from interface to interface. Additionally, recent experiments have shown that surface plasmon polaritons can demonstrate quantum effects like self interference and entanglement. We model the coupling of surface plasmon polaritons in a hyperbolic metamaterial using the Kronig-Penny model. From this, we analyze the phase of the plasmons as they propagate through the material.

Cyrus Vandrevala
Purdue Univ

Date submitted: 15 Nov 2013 Electronic form version 1.4