

Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

A New Strategy for Designing Broadband Epsilon-Near-Zero Metamaterials¹ HON PING LEE, KA SHING HUI, LEI SUN, KIN WAH YU, The Chinese University of Hong Kong — We have developed a new strategy for designing metamaterials in multi-layered film with permittivity being closed to zero over a broad frequency range, which is as known as broadband epsilon-near-zero (ENZ) materials. Milton representation, Bergman-Milton representation and electromagnetic representation of the effective permittivity (ϵ_{eff}) are used, and the strategy consist of the following 3 parts: choosing the operation frequency range, properly placing the poles and zeros into the range, and solving the inverse problem by equating different representations of ϵ_{eff} . Demonstration of the strategy is carried out by zeroth and first order design with several examples. The distribution of electric field inside the designed materials is investigated to reveal the physical principles of the broadband ENZ phenomenon. The study would be further extended to other geometries (e.g. multi-shell cylinder) through conformal transformation. The results obtained are useful for designing ENZ metamaterials.

¹Work supported by the General Research Fund of Hong Kong SAR Government

Lee Hon Ping
The Chinese University of Hong Kong

Date submitted: 13 Dec 2011

Electronic form version 1.4