Abstract Submitted
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Non-local dielectric response of metamaterials and their corresponding magnetic response[1] LUCILA JUAREZ-REYES, W. LUIS MOCHAN, Instituto de Ciencias Fisicas, UNAM — We use an efficient recursive formalism [1] for the calculation of the frequency ω and wavevector $\vec{k}$ dependent macroscopic dielectric function $\epsilon_M(\omega, \vec{k})$ of a nanostructured metamaterial made of dielectric and metallic non-magnetic components, and we obtain its magnetic permeability $\mu_M(\omega)$ from the wavevector dependence of ϵ_M. We apply the formalism to simple systems for which approximate analytic expressions are available, in order to test the limits of applicability of the formalism. We compare the dispersion relation of electromagnetic waves within the system as obtained from the full non-local response $\epsilon_M(\omega, \vec{k})$ to the dispersion relation obtained from the local approximation characterized by $\epsilon_M(\omega) \equiv \epsilon_M(\omega, \vec{k} = 0)$ and $\mu_M(\omega)$ in regions of both positive and negative dispersion.

[1] Jose Samuel Perez-Huerta, Guillermo P. Ortiz, Bernardo S. Mendoza, and W. Luis Mochan, *Macroscopic optical response and photonic bands*, New Journal of Physics **15**(4), 043037 (2013).

[2] W. Luis Mochan, Guillermo Ortiz, Bernardo S. Mendoza and Jose Samuel Perez-Huerta, *Photonic*, Comprehensive Perl Archive Network (CPAN), https://metacpan.org/pod/Photonic.

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