

Abstract Submitted
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Microwave transmission measurements through wire array photonic crystals GRAEME DEWAR, University of North Dakota, NATHAN SOUTHER, MICHAEL JOHNSON — We have measured the microwave transmission between 12.4 and 18.0 GHz through wire arrays formed into two dimensional square lattices. One array made of copper wire 0.16 mm in radius consisted of five rows by 21 columns having a lattice constant of 5.15 mm. This array exhibited a pass band above 15 GHz, in good agreement with the calculated plasma frequency found from an expression for the permittivity¹ derived in the long wavelength limit. A second array was made with wire of radius 18 microns and lattice constant 0.8 mm. This array was filled with dielectric loaded with powdered magnetite. A sample of this metamaterial 5.8 mm thick and with no externally applied magnetic field exhibited a pass band above 16 GHz. Implications for creating metamaterials with a negative index of refraction from wire arrays embedded in a magnetic host will be discussed.

¹G. Dewar, in *Complex Mediums III: Beyond Linear Isotropic Dielectrics*, Akhlesh Lakhtakai, Graeme Dewar, Martin W. McCall, Editors, Proceedings of SPIE Vol. 4806, 156-166 (2002).

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