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Microwave transmission measurements through a magnetic photonic crystal MOHAMED ZEIN RADWAN, GRAEME DEWAR, University of North Dakota — We have measured the 12 – 18 GHz microwave transmission through, and the reflection from, a nickel zinc ferrite penetrated by a wire lattice. The metamaterial efficiently transmitted microwaves under conditions for which the index of refraction was negative. The wires, 0.29 mm in diameter, were threaded through Teflon tubes and centered in holes 1.7 mm in diameter drilled through the ferrite. The holes formed a square array with a lattice constant of 3.0 mm. A ferrite sample containing the wire array filled a length of 3.0 cm inside standard WR-62 waveguide and a static magnetic field between 0.042 and 13.0 kOe was applied parallel to the wires. We measured the transmission relative to an open waveguide and the reflection relative to a reflective metal plate across the waveguide face. We observed transmission modes at combinations of magnetic field and microwave frequency for which both the permeability of the ferrite and permittivity of the wire array were negative.

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