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A spectroscopic multi-angle probe of metamaterial permeability TOM DRISCOLL, University California San Diego, SABARNI PALIT, Duke University, WILLIE PADILLA, Los Alamos National Laboratory, TONG REN, JACK MOCK, Duke University, GREGORY ANDREEV, University California San Diego, SANG-YEON CHO, NAN MARIE JOKERST, DAVID SMITH, Duke University, DIMITRI BASOV, University California San Diego — We present spectroscopic data for acute-angle reflection and transmission of two planar metamaterial samples, one at microwave frequencies and one at far-infrared frequencies. We show that the observed evolution of the magnetic resonance with the increasing angle of incidence is in quantitative agreement with the Fresnel expressions. This finding uncovers a convenient approach towards the retrieval of optical constants of metamaterials by fitting the Fresnel theory to multiple angle-datasets simultaneously; thus obviating the need for phase information. Physically reasonable values for the magnetic permeability are recovered by this no-phase fitting in the case of both the microwave and infrared metamaterials.

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