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Electromagnetic Wave Transmittance Control using Anisotropic Plasma Lattice ERIC MATLIS, THOMAS CORKE, ANTHONY HOFFMAN, University of Notre Dame — Experiments of transmission through a lattice array of plasma columns have shown an absorption band close to the plasma frequency at 14 GHz. The beam was oriented at a 35° incident angle to the planar plasma cell. These experiments were designed to determine if the observed absorption was the result of the isotropic plasma medium or that of an anisotropic metamaterial. Transmission of the microwave energy was not consistent with an isotropic material in which absorption would monotonically increase below the plasma frequency. The experimental results are supported by an anisotropic model which was developed for the plasma permittivity using an effective medium approximation. The plasma columns were modeled as uniform rods with permittivity described by a Drude model while the components of the permittivity tensor was calculated using the Maxwell-Garnett effective medium theory. Electron densities of $n = 4x10^{12}cm^{-3}$ were assumed which is consistent with prior experimental measurements. This model confirms the existence of non-zero imaginary wave vector k in a narrow region centered about 14 GHz.

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