COMPARISON BETWEEN METAL WIRE GRID AND PLASMA WIRE GRID

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Metal wire grids has been used as polarizer in microwave and optical systems, as the spacing between wires *d* becomes sma ller than the wavelength λ, the extinguish ratio between two p olarization becomes large. In this experiment, the metal wire grid is replaced by Cold Cathode Florence Light (CCFL) tube s arranged in a tight formation, and the spacing between tube s is around 8 mm. Several metal wire grids of similar spacing are also constructed. Both kinds of grids are placed in an ane choic chamber and transmission measurements were conduct ed with a network analyzer.

We found that even for metal wire grids, the S_{12} measurement s differ considerably from the early theories [1,2]. For V-V-V polarization, deepest attenuation happens around 1 GHz at ab out -40 dB, and the next significant attenuation happens arou nd 4 GHz when the spacing is changed from 12 mm to 8 mm. Overall, the transmission fluctuates around 10 dB. For metal wire grid V-H-V polarization, there is no low frequency cutof f, but overall fluctuations increase. For the plasma wire grids, the general behavior behaves more like metal wire grids in V-H-V polarizations, there is no low frequency cutoff, and thee are enhancements of transmission at certain frequencies as hi gh as 12 dB.

These measurements suggests: a) the conductivity of the plas ma is much lower than theory. b) The microscopic random m otion of electrons in the plasma renders the macroscopic dire ction of the plasma tubes irrelevant. c) Enhancement in trans mission are caused by resonance from plasma.

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