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Measured polarization rotation loss in negative index metamaterials[1] JOHN DEROV, BEVERLY TURCHINETZ, EVERETT CRISMAN, DRAYTON HANNA, ALVIN DREHMAN, U. S. Air Force Research Lab — The loss mechanisms in left-handed or negative refractive index metamaterial are still not well understood, even for the most common volumetric form using split ring resonators and posts at microwave frequencies. Loss due to polarization rotation, which can only be determined in free space experiments, is both a significant and neglected mechanism. We have measured rotation angles as large as 25 degrees after transmission through negative index media. Polarization rotation is observed as a radiative loss since it reduces the co-polarized power transmitted through the medium. The apparent loss can be reduced by optimizing the receiver polarization. We have measured metamaterial shaped as wedge prisms and rectangular blocks, thereby including and excluding refraction effects. Wedge prisms necessarily include refraction effects. The rectangular blocks can exclude or include refraction by changing the incident angle from normal to oblique. We have investigated whether the polarization type of the transmitted wave is linear or elliptical by using circularly polarized receiver antennas. The results of these measurements will be presented and discussed.

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