A prism based magnifying hyperlens with broad-band imaging

Magnification in metamaterial hyperlenses has been demonstrated using curved geometries or tapered devices, at frequencies ranging from the microwave to the ultraviolet spectrum. One of the main issues of such hyperlenses is the difficulty in manufacturing. In this letter, we numerically and experimentally study a wire medium prism as an imaging device at THz frequencies. We characterize the transmission of the image of two sub-wavelength apertures, observing that our device is capable of resolving the apertures and producing a two-fold magnified image at the output. The hyperlens shows strong frequency dependent artefacts, a priori limiting the use of the device for broad-band imaging. We identify the main source of image aberration as the reflections supported by the wire medium and also show that even the weaker reflections severely affect the imaging quality. In order to correct for the reflections, we devise a filtering technique equivalent to spatially variable time gating so that ultra-broad band imaging is achieved.
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