

Sub-diffraction Imaging with a Negative-Index Metamaterial Based Microwave Superlens

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Lenses made of negative index materials exhibit different focusing behaviors compared to positive index material lenses. Flat lens behavior and imaging below the diffraction limit is possible with negative refractive index lenses [1]. In this study, we made use of negative-index metamaterials and experimentally investigated the focusing behavior of such lenses. A point source is located both outside and inside the NIM superlens [2],[3].

We have shown that it is possible to focus electromagnetic waves by using a planar configuration of lenses that is constructed by using two-dimensional LHMs. Flat lens behavior is observed at 3.89 GHz, where EM waves are focused along the lateral and longitudinal directions.

At 3.77 GHz, where the reflection is measured to be minimum, the focusing effect occurred at the surface of the NIM with a spot size of 0.16λ . We were able to overcome the diffraction limit with a slab-shaped NIM superlens.

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