New Experimental Results and Physical Interpretation of a Near-field Planar Magneto-inductive Lens for 3D-subwavelength Imaging

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Near-field sub-wavelength imaging has been proposed in the optical frequency range by using a planar silver slab [1] and in the microwave regime by using a magnetized ferrite slab [2]. In both cases the physical mechanism involving the imaging is the amplification of the evanescent Fourier harmonics of the electromagnetic field coming from the source by means of the excitation of surface waves in the slab interfaces. More recently a near-field lens operating in the microwave regime based on the excitation of surface magnetoinductive (MI) waves in a twodimensional (2D) planar array of inductively coupled resonators has been reported [3]. The device consists of two parallel 2D arrays of broadside coupled split ring resonators (BCSRR). A loop input antenna is used as field source and a similar output antenna is used to measure the image. The reported device shows 3D super resolution (see Figure 2). After these encouraging results new prototypes were fabricated and a physical interpretation of the results is in progress [4]. The aim of this contribution is to present these new experimental results, altogether with its physical interpretation.

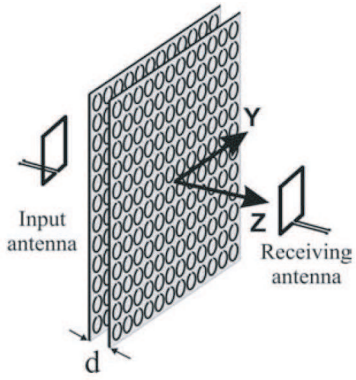

Figure 1: Sketch of the experimental setup.

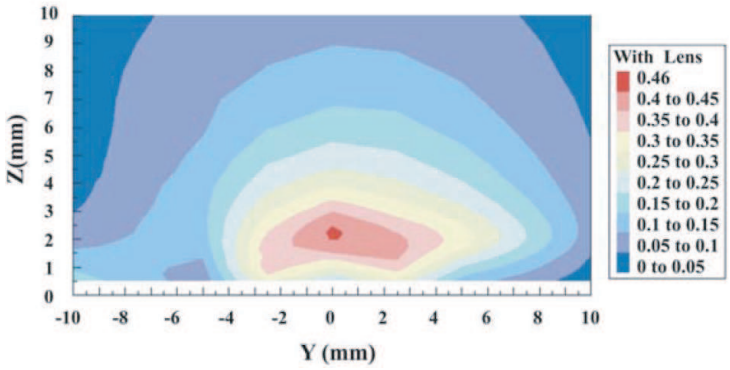

Figure 2: Measurement of the transmission coefficient between the antennas in the device of Figure 1.

REFERENCES

1. Fang, N., H. Lee, C. Sun, and X. Zhang, *Science*, Vol. 308, 534, 2005.
2. Marques, R., F. Mesa, and F. Medina, *App. Phys. Lett.*, Vol. 86, 023505, 2005.
3. Freire, M. and R. Marques, *App. Phys. Lett.*, Vol. 86, 182505, 2005.
4. Marques, R., F. Mesa, M. Freire, and J. D. Baena, *Proc. of the ICECOM05 Conf.*, Dubrownik, Croatia, 2005.