

# Magnification, Demagnification and Transmission of Images with Subwavelength Resolution in Microwave, Terahertz, Infrared and Visible Frequency Ranges

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The resolution of conventional imaging systems is restricted by the diffraction limit: the details smaller than half-wavelength of radiation cannot be resolved. Using novel engineered media with extreme optical anisotropy and their waveguiding properties it is possible to overcome the classical limit and create devices capable of transmitting images with subwavelength resolution over long distances. We report experimental results that demonstrate transmission of a microwave image by means of an array of parallel metallic rods over a distance 3.5 times greater than the wavelength. The resolution of such imaging device is 15 times smaller than the wavelength. The magnifying, demagnifying and repeating properties of lenses formed by long metallic rods provide a unique solution for subwavelength imaging at microwave, terahertz and infrared ranges (up to 70 THz). At microwaves, the resolution of such lenses is determined by the characteristic period, which is limited only by the fabrication capability rather than by any physical constraints. At higher frequencies, the resolution is mainly limited by the skin-depth of the rods material. There is a possibility to create imaging devices operating in the same regime at the visible range using metal-dielectric multilayered structures. This realization is closely related to the hyperlens concept.