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Transmission of images with subwavelength resolution to distances of several wavelengths in microwave, terahertz and infrared ranges PAVEL BELOV, Queen Mary University of London, UK, MARIO SILVEIRINHA, University of Coimbra, Portugal, PEKKA IKONEN, CONSTANTIN SIMOVSKI, SERGEI TRETYAKOV, Helsinki University of Technology, Finland, YAN ZHAO, YANG HAO, CLIVE PARINI, Queen Mary University of London, UK — 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 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 less 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 and terahertz ranges. At microwaves, the resolution of such lenses is mainly 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.

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