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Development of Antennas for Radially Polarized Terahertz Radiation MATTHEW ESCARRA, JASON DEIBEL, KANGLIN WANG, DANIEL MITTLEMAN, Rice University — Recent advances in ultrafast optical techniques have created many new opportunities for sensing and imaging with terahertz radiation. However, much difficulty has been encountered when attempting to develop waveguiding techniques for terahertz pulses. An effective waveguide must exhibit both low loss and low dispersion over a broad frequency bandwidth. It has been demonstrated that a radial mode traveling down a cylindrical metal wire is a promising candidate. Unfortunately, typical Hertzian dipoles generate a linearly polarized field, which couples very poorly to the radially polarized guided mode. We describe a novel photoconductive terahertz antenna design with radial symmetry, which should permit significant improvement in coupling to cylindrical wire waveguides. Finite element simulations demonstrate that this antenna is capable of producing the desired radial mode. Simulations of the antenna coupling to the wire waveguide suggest that a coupling efficiency of greater than 50% is achievable. Experimental analysis of the fabricated antenna supports these simulated results.

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