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Split Ring Resonators for Below Cut-off Energy Propagation DON SHIFFLER, Air Force Research Laboratory, ERIN STRANFORD, Cornell University, DAVID FRENCH, University of Michigan, JACK WATROUS, Numerex LLC
— Metamaterials remain an intense subject of research for a variety of applications, ranging from tailoring the electromagnetic response of a medium in a novel fashion to allowing propagation of electromagnetic power in structures operating below the standard cut-off frequency. Generally, a metamaterial consists of an arrangement, generally periodic, of sub-wavelength, resonant structures. The physical configuration of these structures dictates the electromagnetic response of this artificial medium in such a fashion as to generate a response not typically found in nature. One open question for metamaterials consists of the applicability of these artificial media to high power, both average and peak, operation. We discuss experiments on a split-ring resonator geometry in a below cut-off waveguide, considering the ways in which defects will manifest themselves in the response of the metamaterial. Examination of these defects gives great insight into the basic physical operation of metamaterial structures at finite scales, pointing to the fact that such arrays act more as coupled oscillators than homogeneous media.

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