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Creating wide-band negative-index-of-refraction metamaterials with fractal-based geometry[1] KEITH PENNEY, Cal State University East Bay — A burgeoning topic of modern research in electrodynamics and antenna design is the design and fabrication of "left-handed" metamaterials. This "left-handedness" is often created through use of an array of conductive structures with geometry appropriate for coupling on the wavelength scale with incident radiation to produce a phase-shifted reflected wave that cancels out incoming radiation and prevents transmission. This property has been demonstrated in several papers published in the last decade. In every instance, though the "left-handed" response is only exhibited in a small bandwidth centered about a specific frequency (bandwidth typically less that 0.1 GHz). I will show that through use of tessellated, fractal-based structures, one can create a repeatable geometry that exhibits a negative index of refraction (NIR) for multiple frequency bands, limited only by fabrication precision, with the ultimate goal being a wide-band absorptive response.

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