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Using Cantor Sets to Study the Connectivity of Sierpinski Relatives

This paper presents an exploration of the connectivity of the class of fractals known as the Sierpinski relatives. The Sierpinski gasket (or triangle) is the most well-known relative. The relatives are attractors of iterated function systems that involve the same contractive mappings as for the gasket, combined with symmetries of the square. These relatives all have the same fractal dimension, but different topologies. Some are totally disconnected, some are disconnected with non-trivial paths, some are simply-connected, and some are multiply-connected. For some of the relatives, one can determine the connectivity by considering certain Cantor sets that are relevant subsets. These Cantor sets are variations of the usual middle thirds Cantor set, and can be viewed in binary instead of ternary.