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Fractals, radix representation and automata

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Abstact

The Twin Dragon is a certain well known compact, connected subset of the plane, which appears in the radix representation of complex numbers in base $-1 + i$. It tiles the plane and its boundary is a fractal with Hausdorff dimension $1.5236\ldots$. It is known that the intersection of a (Borel) fractal in $\mathbb{R}^2$ with a straight line reduces its Hausdorff dimension by 1 for a family of lines with positive Lebesgue measure.

Although this theorem applies to the Twin Dragon, all intersections for which the Hausdorff measure is know are exception cases. Following techniques of Akiyama and Scheicher using Büchi automata it is possible to analyse further rational lines.