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Non-PCF Fractals: The Octacarpet and other 4N-Carpets.

The study of analytic structures on self-similar fractal sets was initiated by physicists who discovered that heat flow on such sets had sub-Gaussian rather than Gaussian scaling, indicating that the fundamental physics of these sets was very different than on manifolds. These results were first made rigorous for sets with a finite ramification property, but in the late 1980s Barlow and Bass developed a corresponding theory on a class of generalized Sierpinski carpets. Their approach depends on taking a (weak) limit of Brownian motions on a suitable sequence of closed sets that intersect to the carpet. A key step in proving that the limiting object has sub-Gaussian scaling is showing that the resistance of the approximating domain of scale n is bounded above and below by ρ^n for a factor ρ that depends on the carpet. Computing the exact value of ρ remains an open problem.

We consider the resistance scaling problem for the octacarpet, and more generally for $4N$-carpets, with the goal of showing analogous bounds for the resistance and obtaining numerical estimates for the resistance scaling factors. (Received September 17, 2019)