Brownian Motion and Harmonic Analysis on Sierpinski Carpets

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Abstract. We consider a class of fractal subsets of $\mathbb{R}^d$ formed in a manner analogous to the construction of the Sierpinski carpet. We prove a uniform Harnack inequality for positive harmonic functions; study the heat equation, and obtain upper and lower bounds on the heat kernel which are, up to constants, the best possible; construct a locally isotropic diffusion $X$ and determine its basic properties; and extend some classical Sobolev and Poincaré inequalities to this setting.