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Dirichlet forms and critical exponents on fractals

Let $B_{2,\infty}^{\sigma}$ denote the Besov space defined on a compact set $K \subset \mathbb{R}^d$ which is equipped with an α-regular measure μ. The critical exponent σ^* is the supremum of the σ such that $B_{2,\infty}^{\sigma} \cap C(K)$ is dense in $C(K)$. It is well-known that for many standard self-similar sets K, $B_{2,\infty}^{\sigma^*}$ are the domain of some local regular Dirichlet forms. In this talk, I will explain a new situation we have explored that the underlying fractal sets admit inhomogeneous resistance scalings, which yield two types of critical exponents. We developed a general theory of this on the p.c.f. sets. Our emphasis is on two asymmetric p.c.f. sets that are constructed. We use them to illustrate and examine the theory, the function properties of the associated Besov spaces at the critical exponents, and also the Dirichlet forms on these fractals. This is a joint work with Ka-Sing Lau.