

Multifractal analysis of non-conformal measures

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Let μ be an invariant measure supported on the repeller of a uniformly expanding planar map T . While the local scaling properties of the measure μ at typical points are closely related to its dimension, one is often interested in understanding the scaling of the measure at non-typical points. The multifractal formalism is a type of duality relating the sets of points with given scaling properties with certain statistical smoothness estimates (the L^q -spectrum and related constructions) for the measure μ .

If T is conformal, then the underlying optimization problem satisfies a weak form of convexity and the situation is well-understood. However, without conformality, much less is known. In fact, through some explicit examples, we will see that a wide range of exotic behaviour is possible such strong non-convexity properties, non-differentiability of the L^q -spectrum, and breakdown of duality and the failure of the multifractal formalism. This is based on joint work with Thomas Jordan (Bristol) and István Kolossváry (St Andrews).