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A Positive Operator-Valued Measure Associated to an Iterated Function System

Given an iterated function system (IFS) on a complete and separable metric space Y , there exists a unique compact subset $X \subseteq Y$ satisfying a fixed point relation with respect to this IFS. This subset is called the attractor set, or fractal set, associated to the IFS. The attractor set supports a specific Borel probability measure, called the Hutchinson measure, which itself satisfies a fixed point relation. P. Jorgensen generalized the Hutchinson measure to a projection-valued measure, under the assumption that the IFS does not have essential overlap. The situation when the IFS exhibits essential overlap has also been studied by Jorgensen and colleagues. We build off their work to generalize the Hutchinson measure to a positive operator-valued measure for a general IFS, that may exhibit essential overlap. We also discuss Naimark's dilation theorem with respect to this positive operator-valued measure.