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Good measures on locally compact Cantor sets

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We study the set M(X) of full non-atomic Borel (finite or infinite) measures on a non-compact locally compact Cantor set X. For an infinite measure μ in M(X), the set $\mathfrak{M}_\mu = \{x \in X : {for any compact open set} U \ni x {we have} \mu(U) = \infty \}$ is called defective. We call μ non-defective if $\mu(\mathfrak{M}_\mu) = 0$. The class $M^0(X) \subset M(X)$ consists of probability measures and infinite non-defective measures. We classify measures μ from $M^0(X)$ with respect to a homeomorphism. The notions of goodness and compact open values set $S(\mu)$ are defined. A criterion when two good measures from $M^0(X)$ are homeomorphic is given. For any group-like $D \subset [0,1)$ we find a good probability measure μ on X such that $S(\mu) = D$. For any group-like $D \subset [0,\infty)$ and any locally compact, zero-dimensional, metric space A we find a good non-defective measure μ on X such that $S(\mu) = D$ and $\mathfrak{M}_\mu$ is homeomorphic to A. We consider compactifications cX of X and give a criterion when a good measure $\mu \in M^0(X)$ can be extended to a good measure on cX.

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