

Banach representations and affine compactifications of dynamical systems

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To every Banach space V we associate a compact right topological affine semigroup $E(V)$. We show that a separable Banach space V is Asplund if and only if $E(V)$ is metrizable, and it is Rosenthal (i.e. it does not contain an isomorphic copy of $\mathbb{R}^{\mathbb{N}}$) if and only if $E(V)$ is a Rosenthal compactum. We study representations of compact right topological semigroups in $E(V)$. In particular, representations of tame and HNS-semigroups arise naturally as enveloping semigroups of tame and HNS (hereditarily non-sensitive) dynamical systems, respectively. As an application we obtain a generalization of a theorem of R. Ellis. A main theme of our investigation is the relationship between the enveloping semigroup of a dynamical system X and the enveloping semigroup of its various affine compactifications $Q(X)$. When the two coincide we say that the affine compactification $Q(X)$ is E -compatible. This is a refinement of the notion of injectivity. We show that distal non-equicontinuous systems do not admit any E -compatible compactification. We present several new examples of non-injective dynamical systems and examine the relationship between injectivity and E -compatibility.

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