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RAIKOV SYSTEMS AND ABSTRACT HARMONIC ANALYSIS

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This thesis investigates the structure of Raikov systems and the implications of this structure for the algebraic properties of $M(G)$, the convolution algebra of finite Borel measures on the locally compact abelian group G .

The techniques used are those of modern abstract harmonic analysis and new examples of constructions are obtained of both unexpected pathology and desirable regular phenomena.

A compact perfect subset of Π is a *Dirichlet set* if the constant function 1 can be uniformly approximated by continuous characters $\chi \in \Pi^\wedge \backslash \{1\}$ on A . The second chapter will show that given any Dirichlet set A on Π there exists a singly generated Raikov system containing A such that the Raikov system idempotent associated with this Raikov system is in the closure of the continuous characters $\overline{\Pi^\wedge} \subseteq \Delta M(\Pi)$.

The third chapter shows that for each $n \in \mathbb{Z}^+$ the Raikov systems generated by K_n subsets of $\mathbb{D}_n$ have associated Raikov system idempotent generalized characters lying in the closure of the continuous characters $\overline{\mathbb{D}_n^\wedge}$ in the maximal ideal space $\Delta M(\mathbb{D}_n)$.

The fourth chapter answers a question of Graham and McGehee [3], p. 411, in the negative by constructing a continuous tame probability measure which is supported on a proper Raikov system on Π . It also shows that there exists continuous tame probability measures in $M_0(G)$ concentrated on proper Raikov systems on G where G is a countable

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product of cyclic groups.

The fifth chapter follows the work of Brown and Williamson [1] and define "churning" on $\mathbb{D}_2 = \prod_{i=1}^{\infty} (\mathbb{Z}_2)_i$ and then studies some properties of measures under churning, and shows that $M_0(\mathbb{D}_2)$ and Rad $L^1(\mathbb{D}_2)$ are not closed under churning.

References

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