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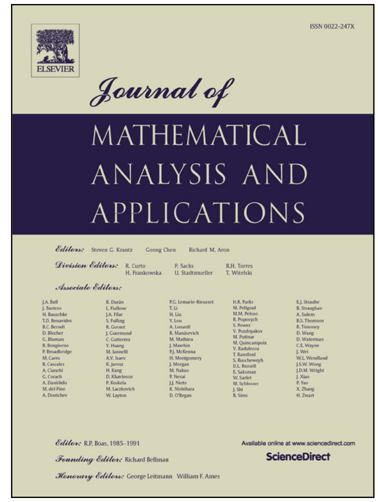

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SPECTRALITY OF CERTAIN MORAN MEASURES WITH THREE-ELEMENT DIGIT SETS

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ABSTRACT. Let $\mathcal{D}_n = \{0, a_n, b_n\} = \{0, 1, 2\}(mod\ 3)$, $p_n \in 3\mathbb{Z}^+$, $n \geq 1$, satisfy $\sup_{n\geq 1} \frac{\max\{|a_n|,|b_n|\}}{p_n} < \infty$. It is well-known that there exists a unique Borel probability measure $\mu_{\{p_n\},\{\mathcal{D}_n\}}$ generated by the following infinite convolution product

$$\mu_{\{p_n\},\{\mathcal{D}_n\}} = \delta_{p_1^{-1}\mathcal{D}_1} * \delta_{(p_1p_2)^{-1}\mathcal{D}_2} * \cdots$$

in the weak convergence. In this paper, we give some conditions to ensure that there exists a discrete set Λ such that the exponential function system $\{e^{2\pi i\lambda x}\}_{\lambda\in\Lambda}$ forms an orthonormal basis for $L^2(\mu_{\{p_n\},\{\mathcal{D}_n\}})$.

CONTENTS

1. Introduction

Let μ be a probability measure with compact support on $\mathbb{R}^n$. We call it a spectral measure if there exists a discrete set $\Lambda \subset \mathbb{R}^n$ such that $E_\Lambda := \{e^{2\pi i\langle\xi,\lambda\rangle} : \lambda \in \Lambda\}$ forms an orthonormal basis for $L^2(\mu)$. The set Λ is then called a spectrum for μ. The existence of spectrum for μ was initiated by Fuglede in his seminal paper [11]. The first example of a singular, non-atomic, spectral measure was constructed by Jorgensen and Pedersen in [14]. This surprising discovery received a lot of attention. The spectral property of fractal measures becomes an active research area, and more spectral fractal measures were found in [15, 19] and [1–3, 5, 9, 12, 13, 17]. The spectral property, Fourier transform [16, 21, 22] and Cauchy transform [6–8, 18] of fractal measure form the main topics in the analysis on fractals.

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