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The concept of Faber derivative in saturation theory†

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Abstract

Let G be a Jordan domain with rectifiable boundary curve. We prove a saturation theorem for Riesz means of Faber series on $\overline{G}$ in terms of the Faber derivative.

Keywords: Faber operator, saturation class, Riesz means.

MSC: Primary 41A40; Secondary 30E10, 40G99.

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§1. Introduction

The classical concept of a strong dyadic (Walsh) derivative was introduced by Butzer and Wagner [7, p. 35, Definition 3.1]. The authors show that if a function g is the r-th strong dyadic derivative $D^{[r]}f$ of the function f of order $r = 1, 2, \ldots$ then $\hat{g}(l) = l^r \hat{f}(l)$ $(l = 0, 1, 2, \ldots)$, where $\hat{f}(l)$ denotes the l-th Walsh-Fourier coefficient of f [7, p. 42, Theorem 4.2, (ii)]. In [20] and [21] Ren, Su and Zheng gave the definition of a strong m-adic derivative and Onneweer in [18] that of a strong $\{m_j\}$-adic derivative. Moreover, the concept of strong dyadic derivative was generalized by Zelin [24, p. 364]: a function g is the strong derivative $T^{\langle r\rangle}f$ of the function f of order $r > 0$ if it satiesfies $\hat{g}(l) = l^r \hat{f}(l)$ $(l = 0, 1, 2, \ldots)$, where $\hat{f}(l)$ denotes the Vilenkin-Fourier coefficients of f [24, p. 369, Theorem 5, (2)].

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