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AN APPLICATION OF JENSEN INEQUALITY IN STUDYING NÖRLUND SUMMABILITY OF FOURIER SERIES

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Abstract. In this paper we give sufficient conditions for the absolute Nörlund summability of Fourier series of functions of the class $\phi\Lambda\mathrm{BV}([-\pi,\pi])$. The crucial step of the proof follows from Jensen and Hölder inequalities.

1. Introduction

Absolute summability of Fourier series is one of the important problems in Fourier Analysis. Many authors (see, e.g., [4, 6, 7, 8, 10, 13, 15]) have studied absolute Nörlund summability of Fourier series. In 1942, McFadden [10] established the theorem for absolute Nörlund summability of Fourier series to class of functions of $\mathrm{Lip}(\alpha)$ and $\mathrm{Lip}(\alpha,p)$. Then this theorem was extended by many authors like S. N. Lal [6, 7], S. N. Lal and Siya Ram [8], M. Izumi and S. Izumi [4], S. M. Shah [13] and R. G. Vyas and K. N. Darji [15]. S. M. Shah extended this theorem for functions of bounded variation whereas S. N. Lal and Siya Ram extended this theorem for functions of r-bounded variation. Lastly this theorem was extended by R. G. Vyas and K. N. Darji for functions of Λ-bounded variation and r-Λ-bounded variation. Here, we study the absolute Nörlund summability of Fourier series of functions of $\phi\Lambda$-bounded variation.

2. Preliminaries

Let $\{p_n\}$ be a sequence of non-negative numbers and let $\{P_n\}$ denote the sequence of partial sums of $\sum_{n=0}^{\infty} p_n$. We assume that $P_n \neq 0$ for all $n \in \mathbb{N}\cup\{0\}$, $P_{-1} = p_{-1} = 0$, $P_{-2} = p_{-2} = 0$. We will call $\{t_n\}$ the Nörlund transform of an arbitrary sequence $\{S_n\}$, where

$$t_n = \frac{1}{P_n}\sum_{k=0}^{n} p_{n-k}S_k,\ \ n = 0, 1, 2, \ldots .$$

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