

On the summability by Norlund methods of series with respect to block-orthonormal systems

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Below a question connected with the problems of the almost everywhere summability by Norlund methods of series with respect to block-orthonormal systems are considered.

Let $\{N_k\}$ be increasing sequence of natural numbers and

$$\Delta_k = (N_k, N_{k+1}], \quad (k \geq 1).$$

Let $\{\varphi_n\}$ be a system of functions from $L^2(0,1)$. The system $\{\varphi_n\}$ will be called a Δ_k -orthonormal system if $\|\varphi_n\|_2 = 1$, $n = 0, 1, 2, \dots$ and $(\varphi_i, \varphi_j) = 0$, for $(i, j) \in \Delta_k$, $i \neq j$, $(k \geq 1)$.

The series $\sum_{n=0}^{+\infty} u_n$ is called summable by Norlund (N, p_n) method to the number S if

$$\lim_{n \rightarrow \infty} \frac{1}{Q_n} \sum_{k=0}^n p_{n-k} S_k = S,$$

where $\{p_n\}$ is a sequence of nonnegative real numbers, $p_0 > 0$, $Q_n = \sum_{k=0}^n p_k$ and $S_n = \sum_{k=0}^n u_k$.

It is studied connection between Norlund (N, p_n) summability a. e. and a.e. convergence of subsequence of partial sums of series $\sum_{n=0}^{+\infty} a_n \varphi_n(x)$ with respect to block-orthonormal systems. It is established conditions on $\{N_k\}$ when the series $\sum_{n=0}^{+\infty} a_n \varphi_n(x)$ with respect to any Δ_k -orthonormal system $\{\varphi_n\}$ is summable by Norlund (N, p_n) method almost everywhere.