

On the absolute matrix summability of Fourier series and some associated series

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Abstract. The object of the paper is to study the absolute matrix summability problem of Fourier series, conjugate series and some associated series under a new set of conditions on matrix methods, generalising many known results in the literature.

Keywords. Absolute summability; triangular matrix; Cesàro mean; Nörlund mean.

1. Preliminaries

1.1. Let $\sum_{n=0}^{\infty} u_n$ be a given infinite series with sequence of partial sums $\{S_n\}$. Let $A = (a_{n,k})$ be an infinite matrix with real or complex elements. The sequence-to-sequence transform

$$t_n = \sum_{k=0}^{\infty} a_{n,k} S_k \quad (1)$$

defines the A -transform of the sequence $\{S_n\}$ provided each t_n exists. If

$$\lim_{n \rightarrow \infty} t_n = S \quad (2)$$

then the series $\sum_{n=0}^{\infty} u_n$ or the sequence $\{S_n\}$ is said to be summable (A) . The series $\sum_{n=0}^{\infty} u_n$ or the sequence $\{S_n\}$ is said to be absolutely summable A or summable $|A|$, if $\{t_n\}$ is of bounded variation, i.e.

$$\sum_{n=1}^{\infty} |t_n - t_{n-1}| < \infty. \quad (3)$$

The method (A) is said to be conservative or absolutely conservative according as

$$\{S_n\} \in (C, 0) \Rightarrow \{t_n\} \in (C, 0)$$

or

$$\{S_n\} \in |C, 0| \Rightarrow \{t_n\} \in |C, 0|.$$