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On L^1-convergence of Fourier series under MVBV condition

Let $f \in L_{2\pi}$ be a real-valued even function with its Fourier series

$$\frac{1}{2}a_0 + \sum_{n=1}^{\infty} a_n \cos nx,$$

and let $S_n(f,x)$, $n \geq 1$, be the n-th partial sum of the Fourier series. It is well known that if the nonnegative sequence $\{a_n\}$ is decreasing and $\lim_{n\to\infty} a_n = 0$, then

$$\lim_{n\to\infty} \|f - S_n(f)\|_L = 0$$

if and only if

$$\lim_{n\to\infty} a_n \log n = 0.$$

We weaken the monotone condition in this classical result to the so-called mean value bounded variation (MVBV) condition. Our main result gives the L^1-convergence of a function $f \in L_{2\pi}$ in complex space, and the generalization of the above classical result is a special case in the real-valued function space.

This is joint work with D. S. Yu and S. P. Zhou.