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Maximally divergent Fourier series in the disc algebra

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From Carleson's theorem it is derived as a special case that a continuous function $\mathbf{T} \to \mathbf{C}$ on the unit circle $\mathbf{T}$ of the complex plane $\mathbf{C}$ is the a.e. sum of its Fourier series. Hence divergence can only be expected at small subsets of $\mathbf{T}$. Existence of periodic continuous functions having divergent Fourier series on prescribed null-measure subsets is well known. In this talk –whose results form a joint work with J. Müller and A. Jung– it is shown that there are large vector spaces of functions in the disc algebra $A(\mathbf{D})$ such that every nonzero member satisfies that the restriction to $\mathbf{T}$ of its Fourier series is maximally divergent, in the sense that, for many small subsets E of $\mathbf{T}$, its partial sums approximate any prescribed function on E. This completes or improves a number of findings by several authors.

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