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ON SOME GENERALIZATION OF THE CLASSICAL CONCEPT OF BOUNDED VARIATION WITH APPLICATIONS

One of the important generalizations of the concept of the bounded variation in the sense of Jordan is the so-called Λ -variation, which was introduced by Waterman in 1972 in connection with his studies on the convergence of Fourier series. It can be proved that a Fourier series of a function f , which belongs to a certain class of functions of Λ -bounded variation, namely, to the class of functions of harmonic bounded variation, converges pointwise to the arithmetic mean of the left and right-hand side limits of f and converges uniformly to f on closed intervals of continuity of the function in question. Furthermore, each larger class contains a continuous function whose Fourier series diverges at a point. During the talk, we are going to discuss some properties of functions of Λ -bounded variation and present their new applications to operator theory and nonlinear differential and integral equations. In particular, we will provide sufficient conditions which guarantee that a convolution operator or a nonautonomous superposition operator maps the space of functions of Λ -bounded variation into itself. In the second part of the talk, we are going to introduce and discuss the concept of the Λ -variation in the L^1 -setting, which allows to deal with the Λ -variation of functions that are almost everywhere equal. (It is worth mentioning that the pointwise Λ -variation, and in particular Jordan variation, are very sensitive to modifications of the values of the given function even on a very small set.) In the case of the Λ -variation in the L^1 -setting illustrative examples as well as applications will be also provided.

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