On functions of bounded p-variation and moduli of p-continuity

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ABSTRACT: We obtain optimal order of constants in the known estimates of the total p-variation and the modulus of p-variation for a periodic function $f \in L^p$ in terms of its L^p-modulus of continuity. Further, we consider classes V_p^α ($1 < p < \infty$, $0 \le \alpha \le 1 - 1/p$) which form a scale connecting the class V_p of functions of bounded p-variation and the Sobolev space W_p^1. We will discuss estimates of V_p^α-norms via both L^p-moduli of continuity and moduli of p-variation.

Our estimates are sharp for any rate of decay of the L^p-modulus of continuity and modulus of p-variation, respectively. Moreover, the constant coefficients in them depend on the parameters in an optimal way.