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8. Analysis

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Exact Inequalities of Kolmogorov Type for Periodic Functions of Small Smoothness

New exact inequalities of the form

$$\left\| x^{(k)} \right\|_q \leq K \left\| x \right\|_p^{\alpha} \left\| x^{(r)} \right\|_s^{1-\alpha} \qquad (1)$$

for periodic functions x with maximal possible exponent α will be presented in the following cases: **1)** $q, p \in [1, \infty], s = \infty;\ r = 2, k = 1$ or $r = 3, k = 1, 2$ or $r = 4, k = 3$ or $r = 6, k = 4, 5$; **2)** $q, p \in [1, \infty], s = 1;\ r = 2, k = 1$; **3)** $p \in [1, \infty), s = 1;\ r = 3, k = 1, q \geq 2p$ or $r = 4, k = 1, q \geq 3p/2$ or $r = 4, k = 2, q \geq 3p$; **4)** $s \in (1, \infty), q = p = \infty;\ r = 2, k = 1$, or $r = 3, k = 2$; **5)** $s \in (1, \infty), q = \infty, p = 1;\ r = 2, k = 1$. Besides some exact inequalities of the type (1) for arbitrary r but special k will be presented. These results are joint work with V. F. Babenko and S. A. Pichugov.