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ESTIMATIONS OF THE SMOOTHNESS MODULES OF DERIVATIVES OF CONVOLUTION OF TWO PERIODIC FUNCTIONS BY MEANS OF THEIR BEST APPROXIMATIONS IN $L_p(\mathbb{T})$

Abstract

In the paper the upper estimations of smoothness modules $\omega_k\left(h^{(s)};\delta\right)_r$ of derivative $h^{(s)}$ of order s of the convolution $h=f*g$ of two 2π periodic functions $f\in L_p(\mathbb{T})$ and $g\in L_q(\mathbb{T})$ are obtained by means of expression containing the product $E_{n-1}(f)_p E_{n-1}(g)_q$ of the best approximations of these functions in the metrics of $L_p(\mathbb{T})$ and $L_q(\mathbb{T})$ respectively, where $k,s\in\mathbb{N}, p,q\in[1,\infty]$, $1/r=1/p+1/q-1\geq 0$, $\mathbb{T}=(-\pi,\pi]$. It is proved in the case $p,q\in(1,\infty)$ that the obtained estimations are exact in the sense of order on classes of convolutions with given majorants of sequences of the best approximations of f and g under some regularity of these majorants.