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

Abstract

In the paper the upper estimations of smoothess modules $\omega_k\left(h^{(s)};\delta\right)_\gamma$ *of derivative* $h^{(s)}$ *of order* $s(h^{(0)}\equiv h)$ *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* $k\in\mathbb{N}$, $s\in\mathbb{Z}_+$, $p,q\in[1,\infty)$, $1/r=1/p+1/q-1>0$, $\gamma\in(r,\infty]$, $\mathbb{T}=(-\pi,\pi]$. *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.*