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Best approximation of sums of elements and a theorem of Newman and Shapiro.  (English. Russian original) [Zbl 0715.41037]

Let $F$ be a normed space with norm $\|\cdot\|_F$, and let $B$ be a subspace of $F$. For $f \in F$ we set $(1) \quad E(f, B, F) = \inf_{g \in B} \|f - g\|_F$. We consider the following problem: find the condition on the elements $f_k \in F$, $1 \leq k \leq N$, $N \geq 2$, under which we have the equality $(2) \quad E(\sum_{k=1}^N f_k, B, F) = \sum_{k=1}^N E(f_k, B, F)$. We obtain criteria for the equality (2) or for its integral analog to hold. As a consequence we present the known result of D. J. Newman and H. S. Shapiro [Duke Math. J. 30, No. 4, 673-681 (1963; Zbl 0116.04502)] on the validity of (2) in the case of the approximation of functions of $m$ variables of the form $\sum_{k=1}^m \psi_k(x_k)$ by generalized polynomials in the uniform metric. It is shown that the variant of the Newman-Shapiro theorem, in the case of the approximation in the integral metric, does not hold. We also show an analog of the Newman-Shapiro theorem for the approximation by entire functions of exponential type.

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References:

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