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Bilinear operators and some generalizations of the approximation spaces

Let $(x, \|\cdot\|)$ a normed Abelian group and $\|\cdot\|^*$ an other norm on X. We consider the sequence $(\mathrm{En}(f))$, where $(\mathrm{En}(f)) = \inf\{\|f-g\| : \|g\|^* < n\}$. Φ will a norming function and $\varphi : [0,\infty) \to [0,\infty)$ is a continuous function such that $\varphi(0) = 0$, $\varphi(x+y) \leq \varphi(x) + \varphi(y)$ and φ is increasing.
The generalized approximation spaces X_Φ^φ are defined as follows:

$$X_\Phi^\varphi = \{f \in X : \Phi\left(\{\varphi\left(\mathrm{En}(f)\right)\}\right) < \varphi\}$$

For $\varphi(t) = t^p$, $0 < p \leq 1$ we obtain the spaces X_Φ^p.
If $B : X \times X \to X$ is a biliniar and bounded operator s. t. $\|B(f,g)\|^* < n^2$ if $\|f\| < n$, $\|g\| < n$, then $B : X_{\bar{\Phi}}^\varphi \times X_{\bar{\Phi}}^\varphi \to X_{\bar{\Phi}}^\varphi$ is also founded if

$$\bar{\Phi} : (\mathrm{En}(f)) \to \Phi\left(\frac{\mathrm{En}(f)}{n}\right) .$$