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THE LITTLEWOOD-ORLICZ OPERATOR IDEAL

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ABSTRACT. In this paper, we show that each continuous linear operator from an $\mathcal{L}_2$-space to an $\mathcal{L}_\infty$-space is Littlewood-Orlicz, and each Littlewood-Orlicz operator from a Banach space to an $\mathcal{L}_2$-space is 2-summing. As a consequence, Littlewood-Orlicz operators from a Banach space with cotype 2 to an $\mathcal{L}_2$-space coincide with 2-summing operators.

1. Introduction. The classes of p-summing operators ($1 \leq p < \infty$) were introduced by Pietsch [**16**] in 1967. Actually, the class of 1-summing operators was studied before in Grothendieck's Résumé [**9**] in 1953. Later, Mityagin and Pelczynski [**13**] and Kwapien [**11**] studied the classes of (q,p)-summing operators, i.e., operators that take weakly p-summable sequences to absolutely q-summable sequences. Cohen [**4**] and Apiola [**1**] studied the classes of 'Cohen's (q,p)-summing operators,' i.e., operators that take weakly p-summable sequences to strongly q-summable sequences. In 1980, Piestch in his monograph [**17**] introduced the classes of (r,q,p)-summing operators. In particular, $(1,q,p)$-summing operators coincide with 'Cohen's (q,p)-summing operators.' Now, with the help of sequential representations of $\ell_p\widehat{\otimes}X$ given by Bu and Diestel [**3**], $(1,q,p)$-summing operators from a Banach space X to a Banach space Y are nothing else but operators that take members in $\ell_p\check{\otimes}X$, the injective tensor product of ℓ_p and X, to members in $\ell_q\widehat{\otimes}Y$, the projective tensor product of ℓ_q and Y.

Bu in [**2**] used $(1,1,2)$-summing operators (called Littlewood-Orlicz operators in [**2**]) to characterize G.T. spaces with cotype 2. In this paper, we will give some properties of Littlewood-Orlicz operators between $\mathcal{L}_p$-spaces. The reasons why we are interested in such operators and why we called them Littlewood-Orlicz operators are as follows.

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