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Maximal theorems and square functions for analytic operators on L_p -spaces

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Let $T : L_p \rightarrow L_p$ be a contraction, with p strictly between 1 and infinity, and assume that T is analytic, that is, there exists a constant K such that $\|T^n - T^{n-1}\| < K$ for any positive integer n . Under the assumption that T is positive (or contractively regular), we establish the boundedness of various Littlewood-Paley square functions associated with T . As a consequence we show maximal inequalities of the form $\|\sup_{n \geq 0} |(n+1)^m| |T^n(T-I)^m(x)|\|_p \lesssim \|x\|_p$, for any nonnegative integer m . We prove similar results in the context of noncommutative L_p -spaces. We also give analogs of these maximal inequalities for bounded analytic semigroups, as well as applications to R -boundedness properties.

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