STRONGLY SPLITTING WEIGHTED SHIFT OPERATORS ON BANACH SPACES AND UNICELLULARITY

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Abstract. We introduce the notion of strong splitting operator on a separable Banach space, and prove a structure theorem for this operator. We consider the weighted shift operator $T$, $T e_n = \lambda_n e_{n+1}$, $n \geq 0$, acting in the Banach space $X$ with basis $\{e_n\}_{n \geq 0}$. We give some sufficient conditions for $X$ and for the weight sequence $\{\lambda_n\}_{n \geq 0}$ under which the operator is unicellular, that is, every nontrivial invariant subspace $E$ of $T$ has the form $E = X_i := \text{Span} \{e_k : k \geq i\}$ for some $i \geq 1$; and prove that the restricted operators $T|X_i$ ($i \geq 1$) are strong splitting. Moreover, we describe in terms of so-called discrete Duhamel operator and diagonal operator all extended eigenvectors of the operators $T|X_i$ ($i \geq 1$).


Keywords and phrases: Banach space, weighted shift operator, strong splitting operator, invariant subspace, Duhamel product.

REFERENCES


