

ON THE STRONG LAW OF LARGE NUMBERS FOR SEQUENCES OF
BLOCKWISE INDEPENDENT AND BLOCKWISE p -ORTHOGONAL
RANDOM ELEMENTS IN RADEMACHER TYPE p BANACH SPACES

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Abstract: For a sequence of random elements $\{V_n, n \geq 1\}$ taking values in a real separable Rademacher type p ($1 \leq p \leq 2$) Banach space and positive constants $b_n \uparrow \infty$, conditions are provided for the strong law of large numbers $\sum_{i=1}^n V_i/b_n \rightarrow 0$ almost surely. We treat the following cases: (i) $\{V_n, n \geq 1\}$ is blockwise independent with $EV_n = 0, n \geq 1$, and (ii) $\{V_n, n \geq 1\}$ is blockwise p -orthogonal. The conditions for case (i) are shown to provide an exact characterization of Rademacher type p Banach spaces. The current work extends results of Móricz [12], Móricz et al. [13], and Gaposhkin [8]. Special cases of the main results are presented as corollaries and illustrative examples or counterexamples are provided.

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Key words and phrases: Blockwise independent random elements, blockwise p -orthogonal random elements, strong law of large numbers, almost sure convergence, Rademacher type p Banach space.

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