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Extreme Contractions on Finite-Dimensional Polygonal Banach Spaces

We explore extreme contractions on finite-dimensional polygonal Banach spaces, from the point of view of attainment of norm of a linear operator. We prove that if X is an n -dimensional polygonal Banach space and Y is any normed linear space and $T \in L(X, Y)$ is an extreme contraction, then T attains norm at n linearly independent extreme points of B_X . Moreover, if T attains norm at n linearly independent extreme points x_1, x_2, \dots, x_n of B_X and does not attain norm at any other extreme point of B_X , then each Tx_i is an extreme point of B_Y . We completely characterize extreme contractions between a finite-dimensional polygonal Banach space and a strictly convex normed linear space. We introduce L-P property for a pair of Banach spaces and show that it has natural connections with our present study. We also prove that for any strictly convex Banach space X and any finite-dimensional polygonal Banach space Y , the pair (X, Y) does not have L-P property. Finally, we obtain a characterization of Hilbert spaces among strictly convex Banach spaces in terms of L-P property.

Keywords: Extreme contractions, polygonal Banach spaces, strict convexity, Hilbert spaces.

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