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A Unified Construction Yielding Precisely Hilbert and James Sequences Spaces

Following R. C. James' approach, we shall define the Banach space $J(e)$ for each vector $e = (e_1, e_2, ..., e_d) \in \mathbb{R}^d$ with $e_1 \neq 0$. The construction immediately implies that $J(1)$ coincides with the Hilbert space l_2 and that $J(1; -1)$ coincides with the celebrated quasireflexive James space J. The results of this paper show that, up to an isomorphism, there are only these two possibilities: (i) $J(e)$ is isomorphic to l_2 if $e_1 + e_2 + ... + e_d \neq 0$, and (ii) $J(e)$ is isomorphic to J if $e_1 + e_2 + ... + e_d = 0$. Such a dichotomy also holds for every separable Orlicz sequence space l_M.

Keywords: Hilbert space, Banach space, James sequence space, quasireflexive space, invertible continuous operator, Orlicz function.

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