EXISTENCE AND PROPERTIES OF FRAMES OF ITERATIONS

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We study the conditions under which a bounded operator on an infinite-dimensional Hilbert space generates a Parseval frame through its iterations. This leads to a new proof of a known characterization for general frames of iterations, showing that some operators admit frames but not Parseval frames.

We also introduce the notion of the index of an operator—the minimal number of vectors needed to generate a frame via iterations—and compute it explicitly. Under suitable conditions, we construct Parseval frames for both an operator and its adjoint using vector-valued Hardy space models and describe when these frames are similar.