SYMMETRIC OPERATORS AND REPRODUCING KERNEL HILBERT SPACES

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A reproducing kernel Hilbert space $\mathcal{H}$ of functions on $\mathbb{R}$ which has a total orthogonal set of point evaluation vectors $(\delta_{x_n})_{n\in\mathbb{Z}}$ is said to have the sampling property, since any $\phi \in \mathcal{H}$ can be perfectly reconstructed from its 'samples' or values taken on the set of points $(x_n)_{n\in\mathbb{Z}}$. The classic example of such a space is the Paley-Wiener space of Ω-bandlimited functions. Such spaces are used extensively in applications including signal processing. In this talk we will apply the theory of self-adjoint extensions of symmetric operators to the study of such spaces. In particular, a sufficient operator-theoretic condition for a subspace of L^2 of the real line to be a reproducing kernel Hilbert space with the sampling property will be presented. Potential consequences for signal processing will be discussed.