Structural or analytic derivation

Let S be the finite span of the evaluation representers. Every f has an orthogonal decomposition $g + \rho$ with $g \in S$, and part (d) shows that any attained minimizer with positive regularization lies in S. Convexity of the loss is unnecessary for this reduction; existence or uniqueness of a minimizer still requires its own assumptions.

Comparative cost and preferred method

An optimization over a Hilbert space reduces exactly to at most N coefficients. The reduction preserves every sampled loss and decreases the penalty by a known nonnegative quantity. It is an exact dimension and optimality statement, not an accuracy assertion about an arbitrary finite truncation. The squared-eigenvalue summability alone must not be used as a replacement for finite point-evaluation norms.