COMMON COMPLEMENTS OF TWO SUBSPACES OF A HILBERT SPACE

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Abstract: In this paper we find a necessary and sufficient condition for two closed subspaces, $X$ and $Y$, of a Hilbert space $H$ to have a common complement, i.e. a subspace $Z$ having trivial intersection with $X$ and $Y$ and such, that $H = X + Z = Y + Z$.

Unlike the finite dimensional case the condition is significantly more subtle than simple equalities of dimensions and codimensions, and non-trivial examples of subspaces without a common complement are possible.

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