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Invariant subspaces for shifts and backward shifts on Banach

Let T be a bounded linear operator on a Banach space, and LatT the collection of its (closed) invariant subspaces. A natural question is whether for any two elements N and M of LatT such that $N \subset M$ and $\dim(M/N) > 1$, there exists another element K of LatT such that $N \subsetneqq K \subsetneqq M$. We consider this problem for shifts and backward shifts on Banach spaces of analytic functions on the unit disc, and provide a complete answer for some of the spaces and a partial answer for others. We show in particular that the answer is positive for the shift on the classical Banach algebras of analytic functions on the unit disc in which the polynomials are dense. In this case the invariant subspaces are the closed ideals.

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Hilbert spaces of entire functions and translation invariant subspaces

It is not known whether every weighted translation invariant ℓ^2 space on the integer group Z has a nontrivial translation invariant subspace. This problem is equivalent to the hyperinvariant subspace problem for invertible bilateral weighted shifts on Hilbert space. By associating to the weights certain Hilbert spaces of entire functions and proving appropriate sampling theorems, we obtain a positive answer for a large class of weights. The method also yields zero-free invariant subspaces of index one for a wide class of weighted Bergman spaces on the unit disc.