

Topics in Bergman space operator theory

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Abstract

A now classical result by Aleman, Richter and Sundberg says that every invariant subspace \mathbb{I} of the unweighted Bergman space of analytic functions in the unit disc can be reconstructed from its wandering subspace $\mathbb{E} = \mathbb{I} \ominus S(\mathbb{I})$ in the sense that

$$\mathbb{I} = \bigvee_{k \geq 0} S^k(\mathbb{E}),$$

where S is the Bergman shift operator and the symbol \bigvee denotes a closed linear span. It is also known that the wandering subspaces of the Bergman space can be of any dimension. The wandering subspaces are naturally parametrized by means of operator-valued Bergman inner functions. These operator-valued Bergman inner functions are in turn naturally described using characteristic operator functions for 2-hypercontractions or transfer functions for certain associated discrete time linear systems. In the course we plan to describe some of these later developments as well as some related topics.