

CONFÉRENCE « ESPACES DE HILBERT DE FONCTIONS ANALYTIQUES »
8–12 DÉCEMBRE 2008

CONFERENCE ON HILBERT SPACES OF ANALYTIC FUNCTIONS
DECEMBER 8–12, 2008

Analytic continuation in backward shift invariant subspaces

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By a famous result, due to Douglas, Shapiro and Shields, functions in backward shift invariant subspaces in Hardy spaces are characterized by the fact that they admit a pseudocontinuation a.e. on \mathbb{T} . More can be said if the spectrum of the associated inner function has holes on \mathbb{T} . Then the functions of the invariant subspaces even extend analytically through these holes. We will discuss the situation in weighted backward shift invariant subspaces. The results on analytic continuation will be applied to consider some embeddings of weighted invariant subspaces into their unweighted companions. Such weighted versions of invariant subspaces appear naturally in the context of Toeplitz operators. A connection between the spectrum of the inner function and the approximate point spectrum of the backward shift in the weighted situation is established in the spirit of results by Aleman, Richter and Ross.