Krein systems on a finite interval: accelerants and continuous potentials

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The notion of an accelerant has been introduced by M.G. Krein in the mid fifties. By definition it is a continuous function k on a finite interval $[-\mathbf{T}, \mathbf{T}]$ such that the convolution integral operator

$$(Tf)(t) = f(t) - \int_0^{\mathbf{T}} k(t-s)f(s)\,ds \quad (0 \leq t \leq \mathbf{T})$$

is positive definite on $L^2(0, \mathbf{T})$. For such a function k the corresponding canonical system of Krein type has a continuous potential on $[0, \mathbf{T}]$. In this talk we deal with the inverse problem: Is each continuous potential on $[0, \mathbf{T}]$ generated by an accelerant. We shall see that after an appropriate modification of the definition of an accelerant the answer is positive, even for matrix-valued kernel functions. Moreover, the accelerant is uniquely determined by the potential. The talk is based on joint work with D. Alpay, I. Gohberg (Z$''$L), L. Lerer, and A.L. Sakhnovich.