On Passive Discrete-Time Systems with a Normal Main Operator

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joint work with Yu. Arlinskiĭ and H. de Snoo

Linear discrete time-invariant systems τ are determined by the system of equations

$$\begin{cases} h_{k+1} = Ah_k + B\xi_k, \\ \sigma_k = Ch_k + D\xi_k, \end{cases} \quad k = 0, 1, 2, \ldots$$

where A, B, C, and D are bounded operators between the underlying separable Hilbert spaces $\mathfrak{H}, \mathfrak{M}$, and $\mathfrak{N}$. The system τ can be described by means of the block operator

$$T = \begin{pmatrix} D & C \\ B & A \end{pmatrix} : \begin{pmatrix} \mathfrak{M} \\ \mathfrak{H} \end{pmatrix} \to \begin{pmatrix} \mathfrak{N} \\ \mathfrak{H} \end{pmatrix}.$$

The system τ is said to be passive if T is contractive. In the talk the emphasis will be on systems whose main operator A is in addition normal. In particular, a general unitary similarity result for such systems is derived by means of a famous approximation result known for complex functions. The talk is a part of some joint work with Yury Arlinskiĭ and Henk de Snoo on so-called passive quasi-selfadjoint systems.