Realizations and Applications

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Suppose f is an analytic function mapping the disk to itself. The realization theorem states, among other things, that f has a transfer function representation; that is, there is a unitary operator $U = \begin{pmatrix} A & B \\ C & D \end{pmatrix}$ such that $f = D + Cz(I - Az)^{-1}B$. Other equivalent statements include von Neumann's inequality and a positive cone condition. This theorem is subject to vast generalisation with broad application. We discuss this, as well as applications in interpolation, Schwarz-Pick type inequalities, rational dilation, and other areas as time permits.