Quadratic Optimal Control through
Spectral and Coprime Factorization

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We study the infinite horizon quadratic cost minimization problem for a linear time-invariant
distributed parameter system with finitely many inputs and outputs. We work in an input/output
framework, and reduce the unstable case to the stable case by the use of a right coprime factor-
ization of the impulse response and a preliminary stabilizing feedback. The stable case is then
solved through spectral factorization. The theory is illustrated with two examples involving
pure time delays.