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Short title: LQG optimality and separation principle for general discrete time partially observed stochastic systems over finite capacity communication channels.

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Review text:

This paper studies a discrete-time linear stochastic system with Gaussian noise and assumes that, in the feedback loop, there is a noisy communication channel preceded by an encoder and succeeded by a decoder (Shannon's model) with finite capacity. It is concerned with conditions for (a) reconstruction of the control system output in terms of the decoder output and (b) stability of it. Both terms, being variants of possible ones, are defined in the paper. The main result is that a necessary condition for reconstruction is expressed by the fact that the channel capacity is larger than the rate distortion between the system output and decoder output. The same conditions are also necessary for stability. The conditions become precise in case the channel is of additive white Gaussian noise type, in which case computations become feasible and demonstrated in the paper. The first two thirds of the paper are devoted to background concepts, definitions and results from the literature, while the last third of it is devoted to showing the results outlined above.