INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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SHORT ABSTRACT

The recent development in communication and networking technologies has made it possible to design distributed systems where different subsystems communicate through some shared communication networks. These systems are called networked control systems (NCSs). They provide many advantages over the classical control systems, such as less wiring costs or no wiring costs in the case of wireless NCSs and remote control facilities. But due to the use of shared communication networks, which are generally lossy, NCSs suffer from some serious issues, e.g., time delays, packet loss, quantization, which make the design of NCSs very complicated. This thesis focuses on the controller design for NCSs with random packet losses. To begin with, an H∞ optimal controller is designed for NCSs operating over lossy communication channels. Considering a more practical system, namely Markovian jump linear system (MJLS), jump linear quadratic (JLQ) and the H∞ optimal controllers are designed with random packet drops. Finally, a smooth nonlinear system is considered. Using a piecewise affine (PWA) approximation, a state-feedback H∞ controller is designed for nonlinear systems over a lossy channel. Further, using the PWA approximation approach, a state-feedback controller is designed that ensures local feedback passivity over a lossy channel.