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H_∞ CONTROL DESIGN FOR BUILDING STRUCTURES UNDER SEISMIC MOTION WITH WIRELESS COMMUNICATION

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Abstract. *In this paper, we contribute to the further development of delay-range-dependent state-feedback aspect of robust control for vibration reduction in a building structure with limited wireless communication capacity subjected to measurement quantization, signal transmission delay and data packet dropout, which appear typically in a network environment. The feedback loop is subjected to a time-varying bounded delay within the sensors and the structure. By using an appropriate Lyapunov-Krasovskii functional and some free weighting matrices, new sufficient conditions in terms of some linear matrix inequalities are established for the existence of desired controllers such that the resulting closed-loop system is asymptotically stable and kept within a prescribed level of H_∞ performance bound. Finally, simulation results are given to illustrate the usefulness of the proposed control methodology.*
Keywords: H_∞ control, Building structure, Wireless communication, Signal transmission delay, Data packet dropout, Measurement quantization

1. **Introduction.** In recent years, more attention has been devoted to the study of networked systems in which control and communication issues are combined together, and all the delays and limitations of the communication channels between sensors, actuators and controllers are taken into account (see instances [1-10]). Networked systems have become an enabling technology for many military, commercial and industrial applications. The study of networked control systems is an interdisciplinary research area, combining both network and control theory. That is, in order to guarantee the stability and performance of networked systems, analysis and design tools based on both network and control