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DESIGN OF A COMPENSATOR FOR AN INFINITE-DIMENSIONAL SYSTEM DISCONCERTED BY STOCHASTIC PERTURBATIONS

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Abstract. We investigate infinite-dimensional systems that are exposed to stochastic structured Lipschitzian multiperturbations and are controlled by dynamic output feedback. For the existence of a compensator that achieves a suboptimal stability radius, necessary and sufficient conditions are derived. These requirements are expressed as operator inequalities.

Keywords. Dynamic output feedback, robust stabilization, stability radius, stochastic systems.

AMS (MOS) subject classification: 93E15, 93D09, 93C25.

1 Introduction

In control theory, problems of robust stability and robust stabilization have gotten a lot of attention. The stability radius approach is one of the most powerful strategies to these problems. The authors of [8] proposed this approach for finite-dimensional systems, and it was later expanded to other system classes and sources of uncertainty (see [11]).

A lot of studies dealing with robust stability and robust stabilization problems in the spirit of H^∞-control or the stability radius method have been developed for stochastic systems. We reference Datko (1970), El Bouhtouri & Pritchard (1993), Keulen (1994), Hinrichsen & Pritchard (1996, 1998), Dragan & Morozan (2003, 2013), and Gershon & Shaked (2017) among them, but they all deal with finite-dimensional systems, (cf. [2, 3, 5, 7, 9, 10]).

For finite and infinite-dimensional deterministic systems, as well as finite-dimensional stochastic systems, suboptimal compensators have been investigated. Hinrichsen and Pritchard (1996) explore continuous finite-dimensional systems subjected to stochastic perturbations and controlled by dynamic output feedback. Matrix inequalities were used to express the necessary and sufficient criteria that ensure a specified stability radius. El Bouhtouri & Pritchard's study has the corresponding results for discrete-time systems