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H_∞ OUTPUT FEEDBACK CONTROL FOR TWO-DIMENSIONAL CONTINUOUS SYSTEMS

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Abstract. This paper is concerned with the problem of H_∞ control for two-dimensional (2-D) continuous systems described by the Roesser state space model. Attention is focused on the design of full-order dynamic output feedback controllers which not only stabilize the given 2-D continuous system, but also reduce the H_∞ norm of the closed-loop transfer function, from the disturbance to the controlled output, to a prescribed level. A version of the bounded realness of 2-D continuous systems is established. Based on this, a sufficient condition for the solvability of the H_∞ control problem is obtained in terms of a set of linear matrix inequalities (LMIs). Then, a desired dynamic output feedback controller can be constructed by solving these LMIs. Finally, an illustrative example is provided to demonstrate the applicability of the proposed method.

Keywords. Bounded realness, H_∞ control, linear matrix inequality, output feedback, two-dimensional continuous systems.

1 Introduction

The problem of H_∞ control for one-dimensional (1-D) systems has received much attention during the past years [4, 20]. The purpose is to design controllers such that the resulting closed-loop system is asymptotically stable and its H_∞ norm is below a prespecified level. It is shown in [4] that a solution to this problem involves solving a set of Riccati equations, while in [7] a linear matrix inequality (LMI) approach was developed and necessary and