Nonlinear Dynamics and Systems Theory, **18** (1) (2018) 92–106

Robust Output Feedback Stabilization and Optimization of Discrete-Time Control Systems

A. G. Mazko *

Institute of Mathematics, National Academy of Sciences of Ukraine
Tereshchenkivs'ka Str., 3, Kyiv, 01004, Ukraine

Received: March 20, 2017; Revised: December 28, 2017

Abstract: The paper is devoted to the problems of output feedback stabilization, robust stabilization, quadratic optimization and generalized H_∞-control for a class of affine discrete-time systems. The solution of robust stabilization problem and evaluation of the quadratic performance criterion for a family of nonlinear nonautonomous control systems are proposed. Methods for construction of control laws providing a robust stability and specified evaluation of the weighted damping level of input signals and initial perturbations are proposed for linear systems with controllable and observable outputs. The application of the main results reduces to solving the systems of linear matrix inequalities.

Keywords: *discrete-time system, output feedback; robust stability; linear matrix inequality; quadratic Lyapunov function, H_∞-control.*

Mathematics Subject Classification (2010): Primary: 93C10, 93C55, 93D09, 93D15, 93D21; Secondary: 34D20, 37N35.

1 Introduction

State and output feedback controllers design for dynamic systems with the prescribed and desired properties is a key problem of control theory. At the same time, the properties of control systems such as asymptotic stability, robustness and optimality of the performance indexes are in the foreground. The main problem in H_∞-control theory for continuous systems is connected with suppression of external and initial perturbations (see, e.g., [1–6] as well as review papers [7–9]). Practical applications of many modern methods for control systems design reduce to solving the linear matrix inequalities (LMI) [10, 11].

* Corresponding author: mailto:mazko@imath.kiev.ua