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Robust Output Feedback Stabilization and Optimization of Control Systems

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Abstract: The paper is devoted to the problems of output feedback stabilization, robust stabilization, quadratic optimization and generalized H_∞-control for some classes of linear and nonlinear dynamical systems. Sufficient stability conditions for the zero state are formulated with the joint quadratic Lyapunov function for a family of control systems with uncertain coefficient matrices. The solution of robust stabilization problem and evaluation of the quadratic performance criterion for a family of nonlinear 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 a class of linear systems with controllable and observable outputs. The application of the main results reduces to solving the systems of linear matrix inequalities.

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

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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 is connected with suppression of external and initial perturbations (see, e.g., [1–5] as well as review papers [6, 7]).

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