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ADAPTIVE OPTIMAL STABILIZATION OF A DISCRETE-TIME MINIMUM-PHASE PLANT UNDER OUTPUT AND INPUT UNCERTAINTIES

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This paper addresses a problem of optimal robust, within the framework of the ℓ_1-theory of robust control, stabilization of a discrete-time minimum-phase plant under large a priori uncertainty. A minimum-phase plant is a control system with stable zeros of the transfer function of the nominal model. The coefficients of the transfer function are assumed to be unknown and belonging to a known bounded polyhedron in the coefficient space. An upper bound of the external disturbance and the amplification factors of the uncertainties (disturbances) in the output and control are also assumed to be unknown. The performance index is the worst asymptotic absolute value of the output in the class of disturbances and uncertainties. The solution of the problem of adaptive optimal stabilization with a prescribed accuracy is based on the method of recurrent objective inequalities, the choice of the performance index of the control problem as the identification criterion, and the use of polyhedral estimates of all unknown parameters. The application of the method of recurrent objective inequalities provides the online verification of current estimates of the unknown parameters and a priori assumptions.

Keywords: adaptive control, optimal control, robust control, bounded disturbance, uncertainty.

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