OPTIMAL TRACKING CONTROL FOR DISCRETE TIME-DELAY SYSTEMS WITH PERSISTENT DISTURBANCES

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ABSTRACT

Optimal tracking control (OTC) for discrete time-delay systems affected by persistent disturbances with quadratic performance indexes is considered. Optimal tracking controller is designed based on a sensitivity approximation approach. By introducing a sensitivity parameter, we transform the original OTC problem into a series of difference equations without time-advance on time-delay terms. The obtained OTC law consists of analytic feedback and feedforward terms, and a compensation term, which is the sum of the infinite series of adjoint vectors. The compensation term can be obtained with an iterated formula for the adjoint vectors. A simulation example shows that the approximation approach is effective in tracking the reference input and robust with respect to exogenous persistent disturbances.

KeyWords: Discrete systems, time-delay systems, persistent disturbances, optimal tracking control, sensitivity approach.