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Sampled-Data Output Feedback Control for Nonlinear Systems in the  
Presence of Disturbance

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**Performance Recovery of Regional Input-to-State Stabilization by  
Sampled-Data Output Feedback Control for Nonlinear Systems in the  
Presence of Disturbance**

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**Abstract**—This paper addresses the design of sampled-data output feedback control for nonlinear systems in the presence of exogenous disturbance, which is based on the state feedback control for the continuous-time system. It connects the relationship of uniform regional input-to-state stabilization of sampled-data controller with state feedback control for the original continuous-time system. It shows that not only ISS but also trajectories convergence will be recovered, provided sufficiently small sampling period. Moreover, the advantage of the proposed method of designing a sample-data controller over that of designing a discretized controller for an approximate model is illustrated. An application using high-gain observers to a nonminimum phase single-link flexible robot demonstrates the simplicity of synthesis procedure of the proposed method.

**Keywords:** Nonlinear systems; Sampled-data; Output feedback; Disturbance; Input-to-State Stability (ISS)

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