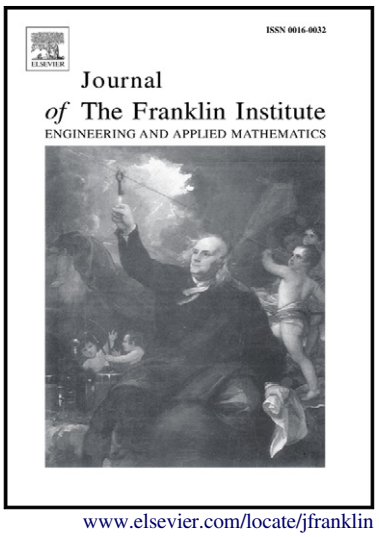

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Optimal Control for Linear and Nonlinear Semistabilization

by

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Abstract

The state feedback linear-quadratic optimal control problem for asymptotic stabilization has been extensively studied in the literature. In this paper, the optimal linear and nonlinear control problem is extended to address a weaker version of closed-loop stability, namely, semistability, which involves convergent trajectories and Lyapunov stable equilibria and which is of paramount importance for consensus control of network dynamical systems. Specifically, we show that the optimal semistable state-feedback controller can be solved using a form of the Hamilton-Jacobi-Bellman conditions that does not require the cost-to-go function to be sign definite. This result is then used to solve the optimal linear-quadratic regulator problem using a Riccati equation approach. Finally, two numerical examples are presented to demonstrate the efficacy of the proposed linear and nonlinear semistabilization framework.

Key Words: Optimal control, nonlinear control, semistabilization, semicontrollability, semiobservability, Hamilton-Jacobi-Bellman theory, least squares Riccati solutions

Running Title: Optimal Control for Semistabilization

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