Efimov, Denis; Fridman, Emilia; Perruquetti, Wilfrid; Richard, Jean-Pierre
Homogeneity of neutral systems and accelerated stabilization of a double integrator by measurement of its position. (English) [Zbl 1447.93251]
Automatica 118, Article ID 109023, 8 p. (2020).

Summary: A new theory of homogeneity for neutral type systems with application to fast stabilization of the 2nd-order integrator is proposed. It is assumed that only the position is available for measurements, and the designed feedback uses the output and its delayed values without an estimation of velocity. It is shown that by selecting the closed-loop system to be homogeneous with negative or positive degree, it is possible to accelerate the rate of convergence in the system at the price of a small steady-state error. Robustness of the developed stabilization strategy with respect to exogenous perturbations is investigated. The efficiency of the proposed control is demonstrated in simulations.

MSC:
93D05 Lyapunov and other classical stabilities (Lagrange, Poisson, $L^p$, $l^p$, etc.) in control theory
93B35 Sensitivity (robustness)

Keywords:
stabilization; neutral systems; 2nd-order integrator; robustness

Full Text: DOI Link

References: