

**Grujić, L. T.**

**New approach to asymptotic stability: Time-varying nonlinear systems.** (English)

Zbl 0876.34060

Int. J. Math. Math. Sci. 20, No. 2, 347-366 (1997).

Summary: The results of the paper concern a broad family of time-varying nonlinear systems with differentiable motions. The solutions are established in form of necessary and sufficient conditions for: 1) uniform asymptotic stability of the zero state, 2) for an exact single construction of a system Lyapunov function and 3) for an accurate single determination of the (uniform) asymptotic stability domain. They permit arbitrary selection of a function  $p(\cdot)$  from a defined functional family to determine a Lyapunov function  $v(\cdot)$ ,  $[v(\cdot)]$ , by solving  $v'(\cdot) = -p(\cdot)$  (or equivalently  $v'(\cdot) = -p(\cdot)[1 - v(\cdot)]$ ), respectively. Illustrative examples are worked out.

**MSC:**

**34D20** Stability of solutions to ordinary differential equations

**93D05** Lyapunov and other classical stabilities (Lagrange, Poisson,  $L^p$ ,  $l^p$ , etc.)  
in control theory

**93D20** Asymptotic stability in control theory

Cited in **1** Document

**Keywords:**

time-varying nonlinear systems; differentiable motions; uniform asymptotic stability; Lyapunov function

**Full Text:** [DOI](#) [EuDML](#)