1. Record Nr. UNINA9910438050103321

Autore	Shaikhet Leonid
Titolo	Lyapunov functionals and stability of stochastic functional differential equations / / by Leonid Shaikhet
Pubbl/distr/stampa	Cham : , : Springer International Publishing : , : Imprint : Springer, , 2013
ISBN	3-319-00101-9
Edizione	[1st ed. 2013.]
Descrizione fisica	1 online resource (342 p.)
Disciplina	515.35 515.392 515/.35
Soggetti	Control engineering Difference equations Functional equations Statistical physics Dynamical systems Calculus of variations Probabilities Vibration Dynamics Control and Systems Theory Difference and Functional Equations Complex Systems Calculus of Variations and Optimal Control; Optimization Probability Theory and Stochastic Processes Vibration, Dynamical Systems, Control
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Short Introduction to Stability Theory of Deterministic Functional Differential Equations -- Stability of Linear Scalar Equations -- Stability of Linear Systems of Two Equations -- Stability of Systems with Nonlinearities -- Matrix Riccati Equations in Stability of Linear Stochastic Differential Equations with Delays -- Stochastic Systems with

Markovian Switching -- Stabilization of the Controlled Inverted Pendulum by Control with Delay -- Stability of Equilibrium Points of Nicholson’s Blowflies Equation with Stochastic Perturbations -- Stability of Positive Equilibrium Point of Nonlinear System of Type of Predator-Prey with Aftereffect and Stochastic Perturbations -- Stability of SIR Epidemic Model Equilibrium Points -- Stability of Some Social Mathematical Models with Delay by Stochastic Perturbations.

Sommario/riassunto

Stability conditions for functional differential equations can be obtained using Lyapunov functionals. Lyapunov Functionals and Stability of Stochastic Functional Differential Equations describes the general method of construction of Lyapunov functionals to investigate the stability of differential equations with delays. This work continues and complements the author’s previous book Lyapunov Functionals and Stability of Stochastic Difference Equations, where this method is described for discrete- and continuous-time difference equations. The text begins with a description of the peculiarities of deterministic and stochastic functional differential equations. There follow basic definitions for stability theory of stochastic hereditary systems, and a formal procedure of Lyapunov functionals construction is presented. Stability investigation is conducted for stochastic linear and nonlinear differential equations with constant and distributed delays. The proposed method is used for stability investigation of different mathematical models such as: • inverted controlled pendulum; • Nicholson's blowflies equation; • predator-prey relationships; • epidemic development; and • mathematical models that describe human behaviours related to addictions and obesity. Lyapunov Functionals and Stability of Stochastic Functional Differential Equations is primarily addressed to experts in stability theory but will also be of interest to professionals and students in pure and computational mathematics, physics, engineering, medicine, and biology.