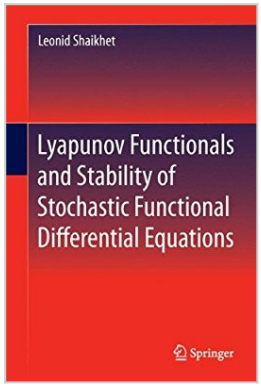

Lyapunov Functionals and Stability of Stochastic Functional Differential Equations

By Leonid Shaikhet

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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 difference equations with discrete and continuous time. The text begins with both a description and a delineation of the peculiarities of deterministic and stochastic functional differential equations. There follows basic definitions for stability theory of stochastic hereditary systems, and the 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.

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Lyapunov Functionals and Stability of Stochastic Functional Differential Equations By Leonid Shaikhet Bibliography

- Sales Rank: #5553303 in Books
- Published on: 2013-03-30
- Original language: English
- Number of items: 1
- Dimensions: 9.20" h x .90" w x 6.30" l, 1.85 pounds
- Binding: Hardcover
- 342 pages

Editorial Review

Review

From the reviews:

"This is a book entirely devoted to the stability of stochastic functional differential equations, including various stochastic delay differential equations. This book is well written by a true expert in the field. In addition to analysis, it contains many simulation results. This book should be beneficial to researchers both in mathematics and control areas and in various applied areas who need to use stability." (Fuke Wu, Mathematical Reviews, January, 2014)

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