A volume in the **Nonlinear Systems in Aviation, Aerospace, Aeronautics, and Astronautics** series

STABILITY DOMAINS

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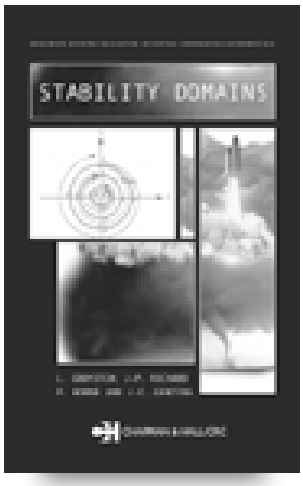
New concepts and methodologies yield solutions to classic, fundamental problems



Domains of Lyapunov stability properties and practical stability properties are concepts that are taking the stability theory of nonlinear dynamical systems in new directions. Emerging methodologies based on these concepts overcome the inherent drawbacks of the Lyapunov stability concept and strengthen it to the point where it can meet practical engineering requirements.

Stability Domains is an up-to-date account of stability theory with a unique emphasis on stability domains. It sets forth and proves stability criteria in their complete form and presents various approaches based on those criteria to determining stability domains exactly. The author introduces a new Lyapunov-like technique that generalizes Lyapunov's methodology for time-invariant linear systems, and in doing so provides complete solutions to three fundamental stability problems. It allows:

- Direct construction of a system Lyapunov function
- Stability conditions that are both necessary and sufficient but not expressed in terms of the existence of a Lyapunov function
- The determination of exact stability domains

This book offers a unique opportunity to explore and acquire expertise in new stability concepts that lead to effective, practical solutions to long-standing real-world problems. It opens the door to new research directions in stability theory and provides tools for its effective application.

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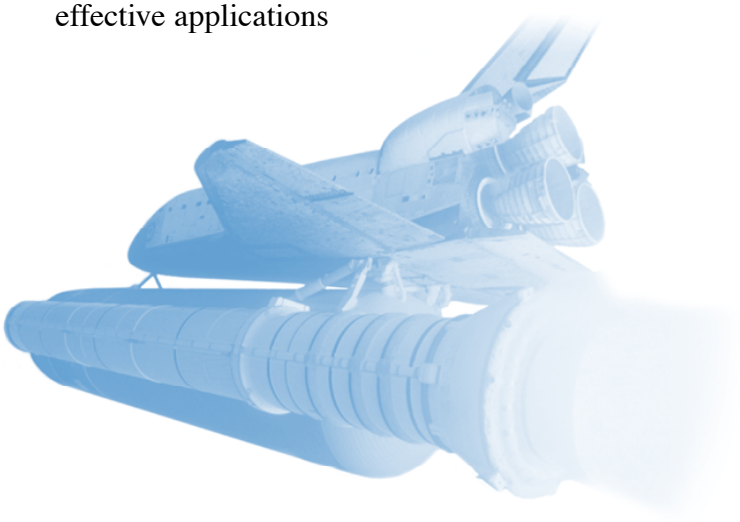
FEATURES

- Introduces classical Lyapunov and practical stability theory for time-invariant nonlinear systems in general, and for complex (interconnected, large scale) nonlinear dynamical systems in particular
- Introduces ideas, such as the domains of Lyapunov stability properties, that overcome the drawbacks of Lyapunov's concept and satisfy engineering requirements
- Builds a background for studying existence and continuity of motions, properties of limit sets, features of system regimes and invariant sets, dynamical and generalized dynamical systems, and the invariance properties of stability domains
- Exposes the vector norms-based stability criteria both in general and for estimating stability domains of complex nonlinear dynamical systems
- Opens new theoretical directions for stability theory and new tools for broader and more effective applications



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