
This book reports the development of fault diagnosis and fault-tolerant control (FTC) methods with their application to real plants. After an introduction to fault diagnosis and FTC, a chapter on actuators and sensors in systems with varying degrees of
nonlinearity leads to three chapters in which the design of FTC systems is given thorough coverage for real applications: a
winding machine typifying a subsystem in various sheet and film processes; a hydraulic 3-tank system representative of those
used widely in chemical plants; and an active suspension system demonstrating application in whole large-scale systems by
splitting into subsystems. Actuator and sensor faults are accommodated within the control-law design and the integration of fault
diagnosis models in the FTC systems described. Linearized systems around an operating point and nonlinear systems are
discussed and illustrated. A complete simulation platform of the 3-tank system is provided via download from www.springer.com

Fault Tolerant Control Systems Related Books

Fault Diagnosis and Fault-Tolerant Control Strategies for Non-Linear Systems
This book presents selected fault diagnosis and fault-tolerant control strategies for non-linear systems in a
unified framework. In particular, starting from advanced state estimation strategies up to modern soft
computing, the discrete-time description of the system is employed Part I of the book presents original
research results regarding state estimation and neural networks for robust fault diagnosis. Part II is devoted
to the presentation of integrated fault diagnosis and fault-tolerant sys...

Set-theoretic Fault-tolerant Control in Multisensor Systems
Fault-tolerant control theory is a well-studied topic but the use of the sets in detection, isolation and/or
reconfiguration is rather tangential. The authors of this book propose a systematic analysis of the
set-theoretic elements and devise approaches which exploit advanced elements within the field. The main
idea is to translate fault detection and isolation conditions into those conditions involving sets. Furthermore,
these are to be computed efficiently using positive invariance and reachab...

Analysis and Synthesis of Fault-Tolerant Control Systems
In recent years, control systems have become more sophisticated in order to meet increased performance
and safety requirements for modern technological systems. Engineers are becoming more aware that
conventional feedback control design for a complex system may result in unsatisfactory performance, or
even instability, in the event of malfunctions in actuators, sensors or other system components. In order to
circumvent such weaknesses, new approaches to control system design have emerged which c...

Fault Detection and Fault-Tolerant Control Using Sliding Modes
Fault Detection and Fault-tolerant Control Using Sliding Modes is the first text dedicated to showing the
latest developments in the use of sliding-mode concepts for fault detection and isolation (FDI) and
fault-tolerant control in dynamical engineering systems. It begins with an introduction to the basic concepts
of sliding modes to provide a background to the field. This is followed by chapters that describe the use and
design of sliding-mode observers for FDI using robust fault reconstruction...

Diagnosis and Fault-Tolerant Control
The book presents effective model-based analysis and design methods for fault diagnosis and fault-tolerant
control. Architectural and structural models are used to analyse the propagation of the fault through the
process, to test the fault detectability and to find the redundancies in the process that can be used to
ensure fault tolerance. Design methods for diagnostic systems and fault-tolerant controllers are presented
for processes that are described by analytical models, by discrete-event mo...

Fault-Tolerant Process Control
Fault-Tolerant Process Control focuses on the development of general, yet practical, methods for the
design of advanced fault-tolerant control systems; these ensure an efficient fault detection and a timely
response to enhance fault recovery, prevent faults from propagating or developing into total failures, and
reduce the risk of safety hazards. To this end, methods are presented for the design of advanced
fault-tolerant control systems for chemical processes which explicitly deal with actuator...
Fault Tolerant Flight Control

The European Flight Mechanics Action Group FM-AG(16) on Fault Tolerant Control, established in 2004 and concluded in 2008, represented a collaboration involving thirteen European partners from industry, universities and research establishments under the auspices of the Group for Aeronautical Research and Technology in Europe (GARTEUR) program. The book consists of five parts. Part I contains the introduction and motivation of this research project and a state-of-the-art overview in Fault Tolerant...

Diagnosis and Fault-Tolerant Control

This book presents model-based analysis and design methods for fault diagnosis and fault-tolerant control. Architectural and structural models are used to analyse the propagation of the fault through the process, test fault detectability and reveal redundancies that can be used to ensure fault tolerance. Case studies demonstrate the methods presented. The second edition includes new material on reconfigurable control, diagnosis of nonlinear systems, and remote diagnosis, plus new examples and ...

Fault-Tolerant Systems

There are many applications in which the reliability of the overall system must be far higher than the reliability of its individual components. In such cases, designers devise mechanisms and architectures that allow the system to either completely mask the effects of a component failure or recover from it so quickly that the application is not seriously affected. This is the work of fault-tolerant designers and their work is increasingly important and complex not only because of the increasing ...

Rigorous Development of Complex Fault-Tolerant Systems

Many software systems have reached a level of complication, mainly because of their size, heterogeneity and distribution, which results in faults appearing that cannot be traced back easily to the code. Some of these "faults" could also be unexpected program behavior that appears as a result of interactions between different parts of the program; this is commonly known as complexity. New methods, approaches, tools and techniques are needed to cope with the increasing complexity in software syste...

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