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adaptive sliding mode
control method is
presented for the

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Longitudinal model of a generic hypersonic vehicle subject to uncertainties and external disturbance.

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The sliding mode control has been an effective tool for stabilization and stable control of nonlinear systems with

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disturbances and uncertainties [1,37]. The sliding mode controllers can reduce the order of original systems, and can achieve the finite-time convergence of the closed-loop control system [30,35,41,54].

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twisting sliding mode controller (ST SMC) is designed based on system states and estimated disturbance. The nonlinear disturbance observer (NDO) estimates the mismatch between the electrical and mechanical power and then the estimated value is employed in the controller design to compensate the

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disturbance.

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The designed observer-based adaptive sliding mode controller not only can adapt the unknown upper bounds of matched nonlinearity and disturbance but also the reachability of system state trajectories, and the

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error state system can be satisfied. Meanwhile, the stochastic stability of the closed-loop system can be guaranteed.

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algorithm for uncertain nonlinear systems The proposed nonlinear adaptive sliding-mode observer is a modified version of that one proposed in [24] Such a modification lies in Adaptive sliding-mode observer for second order ...

~~[DOC] Nonlinear Adaptive Observer Based~~

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~~Sliding Mode ...~~

The proposed an adaptive backstepping sliding mode control

based on nonlinear disturbance observer (ABSMC + NDO) has

two main advantages:

First, the NDO is utilized to compensate for the mismatched disturbances in the virtual control law.

Second, it not only alleviates the chattering

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problem but also
improves tracking
precision.

~~Adaptive Backstepping
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study. An adaptive super
twisting sliding mode
controller (ST-SMC) is
designed based on system
states and estimated
disturbance. The
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observer (NDO)

estimates the mismatch between the electrical and mechanical power and then the estimated value is employed in the controller design to compensate the disturbance.

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adaptive neural sliding mode controller is developed for a class of multivariable uncertain nonlinear systems. For these systems not all state variables are available for measurements.

~~Observer based adaptive neuro-sliding mode control for ...~~

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proposed by for a class of nonlinear systems with unknown parameters and faults. Based on the main properties of the sliding-mode observers, an asymptotic fault reconstruction is given taking into account that the relative degree of the output, with respect to the fault, is equal to one.

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nonlinear systems in this paper. In the situation that the internal states of the system are not available, we design a neural...

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unknown parameters in
unmeasured state

dynamics Nabil Oucief,
Mohamed Tadjine, and

Salim Labiod

Transactions of the
Institute of Measurement

and Control 2016:4,
1297-1308

~~A new methodology for
an adaptive state observer
design ...~~

In control systems,

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sliding mode control is a nonlinear control method that alters the dynamics of a nonlinear system by application of a discontinuous control signal that forces the system to "slide" along a cross-section of the system's normal behavior. The state-feedback control law is not a continuous function of time. Instead,

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it can switch from one continuous structure to another based on the current position in the state space. Hence, sliding mode control is a variable structure control m

~~Sliding mode control~~
~~Wikipedia~~

In this paper, a perturbation observer-based adaptive passive

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control scheme is developed to provide great robustness of nonlinear systems against the unpredictable uncertainties and disturbances therein. The proposed scheme includes a high-gain perturbation observer and a robust passive controller.

~~Perturbation observer-~~

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~~Control For~~
based adaptive passive
control for ...

A composite control
method is proposed
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control and disturbance
observer theory for a
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These techniques are a)
Adaptive backstepping
sliding mode control and
b) Nonlinear disturbance
observer based
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mode control. Adaptive
backstepping sliding
mode control estimates
the system uncertainties
and disturbance using an
adaptive law. Lyapunov
theory is used to define
the adaptive law for the

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This book introduces
several observer-based
methods, including: •

- the sliding-mode observer
- the adaptive observer
- the unknown-input observer and
- the descriptor observer method for the problem

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of fault detection, isolation and estimation, allowing readers to compare and contrast the different approaches. The authors present basic material on Lyapunov stability theory, H_∞ control theory, sliding-mode control theory and linear matrix inequality problems in a self-contained and step-by-step manner. Detailed

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and rigorous mathematical proofs are provided for all the results developed in the text so that readers can quickly gain a good understanding of the material. MATLAB® and Simulink® codes for all the examples, which can be downloaded from <http://extras.springer.com>, enable students to follow

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the methods and illustrative examples easily. The systems used in the examples make the book highly relevant to real-world problems in industrial control engineering and include a seventh-order aircraft model, a single-link flexible joint robot arm and a satellite controller. To help readers quickly find the information they

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need and to improve readability, the individual chapters are written so as to be semi-independent of each other. Robust Observer-Based Fault Diagnosis for Nonlinear Systems Using MATLAB® is of interest to process, aerospace, robotics and control engineers, engineering students and researchers with a control

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on new trends in the design of observer-based controllers for which the separation principle is well established. In addition, since the theoretical developments remain more advanced than the engineering applications, more experimental results are still needed. A wide range of applications are covered, and the book

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contains worked examples which make it ideal for both advanced courses and researchers starting in the field.

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fields of power systems,
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and automotive systems

Sliding Mode

This book presents
recent advanced
techniques in sliding
mode control and
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focusing on their
applications in polymer
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fuel cells and power converters. Readers will find not only valuable new fault detection and isolation techniques based on sliding mode control and observers, but also a number of robust control and estimation methodologies combined with fuzzy neural networks and extended state observer

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methods. The book also provides necessary experimental and simulation examples for proton exchange membrane fuel cell systems and power converter systems. Given its scope, it offers a valuable resource for undergraduate and graduate students, academics, scientists and engineers who are

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Linlin Li addresses the analysis and design issues of observer-based FD and FTC for nonlinear systems. The author analyses the existence conditions for the nonlinear observer-based FD systems to gain a deeper insight into the construction of FD systems. Aided by the T-

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S fuzzy technique, she recommends different design schemes, among them the L_{∞}/L_2 type of FD systems. The derived FD and FTC approaches are verified by two benchmark processes.

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systems. The proposed control systems hold two important features: (1)

The system is robust with the variation in plant parameters and

disturbances (2) The system adapts to

parametric uncertainties even in the unknown

plant structure by self-training and self-

estimating the unknown factors. The various

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kinds of robust adaptive controls represented in this book are composed of sliding mode control, model-reference adaptive control, gain-scheduling, H-infinity, model-predictive control, fuzzy logic, neural networks, machine learning, and so on. The control objects are very abundant, from cranes, aircrafts, and wind turbines to

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automobile, medical and sport machines, combustion engines, and electrical machines.

Sliding Mode

The governing equations of mathematical, chemical, biological, mechanical and economical models are often nonlinear and too complex to be solved analytically. Perturbation theory provides effective

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The sliding mode control methodology has proven effective in dealing with complex dynamical

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systems affected by disturbances, uncertainties and unmodeled dynamics.

Robust control technology based on this methodology has been applied to many real-world problems, especially in the areas of aerospace control, electric power systems, electromechanical systems, and robotics.

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Sliding Mode Control and Observation represents the first textbook that starts with classical sliding mode control techniques and progresses toward newly developed higher-order sliding mode control and observation algorithms and their applications. The present volume addresses a range of sliding mode control

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- *Conventional sliding mode controller and observer design
- *Second-order sliding mode controllers and differentiators

- *Frequency domain analysis of conventional and second-order sliding mode controllers

- *Higher-order sliding mode controllers and differentiators
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observers *Sliding mode

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*Numerous applications,
including reusable launch
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formation control, blood
glucose regulation, and
car steering control are
used as case studies

Sliding Mode Control
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at graduate students with

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a basic knowledge of classical control theory and some knowledge of state-space methods and nonlinear systems, while being of interest to a wider audience of graduate students in electrical/mechanical/aerospace engineering and applied mathematics, as well as researchers in electrical, computer, chemical, civil,

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mechanical, aeronautical,
and industrial
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mathematicians, control
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provides the necessary
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engineers to robustly
control complex and
uncertain nonlinear
dynamical systems.

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Exercises provided at the end of each chapter make this an ideal text for an advanced course taught in control theory.

This book presents solutions to control problems in a number of robotic systems and provides a wealth of worked-out examples with full analytical and numerical details,

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graphically illustrated to aid in reader comprehension. It also presents relevant studies on and applications of robotic system control approaches, as well as the latest findings from interdisciplinary theoretical studies.

Featuring chapters on advanced control (fuzzy, neural, backstepping, sliding mode, adaptive,

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predictive, diagnosis, and fault-tolerant control), the book will equip readers to easily tailor the techniques to their own applications.

Accordingly, it offers a valuable resource for researchers, engineers, and students in the field of robotic systems.

Due to its abilities to compensate disturbances

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and uncertainties, disturbance observer based control (DOBC) is regarded as one of the most promising approaches for disturbance-attenuation.

One of the first books on DOBC, Disturbance Observer Based Control: Methods and Applications presents novel theory results as well as best practices for

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into account all the features of Ito equations, Markovian switching, interval systems and time-lag. The theory developed is applicable in different and complicated situations in many branches of science and industry./a

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