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It is well known that the non-singular terminal sliding mode control (NTSMC) can guarantee a finite time convergence and fast response , , and NTSMC has been extensively extended to several practical control systems, such as spacecraft control , , aircraft control , , underwater vehicle , , robot manipulator , , , motor control system , exoskeleton system and so on. To our best knowledge, few literatures exist designing the IGC law with NTSMC method.

A novel non-singular terminal sliding mode control-based ...

This paper proposes a novel nonsingular terminal

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sliding mode control combined with global sliding surface for a class of uncertain nonlinear second-order systems. The suggested control approach is developed based on the Lyapunov theory. The sliding mode reaching the sliding surface in finite time can be guaranteed.

A novel nonsingular terminal sliding mode control combined ...

Therefore, the key issue to diminish the chattering is to decrease the value of sliding mode controller's gain to an acceptable minimal level defined by the so called reaching condition for the sliding mode's existence. For this reason, the nonsingular terminal sliding mode (NTSM) control method and the adaptive technique have been considered in this paper to develop a novel adaptive NTSM control method, which can be used to search the minimal value of the control gain automatically in the ...

A novel adaptive nonsingular terminal sliding mode ...

A novel adaptive second-order nonsingular terminal sliding mode guidance law design Shuai Xu, Min Gao, Dan Fang, Yi Wang, and Baochen Li Proceedings of the Institution of Mechanical Engineers, Part G: Journal of Aerospace Engineering 0 10.1177/0954410020926769

A novel adaptive second-order nonsingular terminal sliding ...

A Novel Global Fast Terminal Sliding Mode Control Scheme for Second-Order Systems Abstract: To speed up the response and reduce the chattering of a sliding mode control system, a novel reaching law with two variable power terms is proposed, which makes the

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system have a fast approaching rate either far away from or close to the sliding surface.

A Novel Global Fast Terminal Sliding Mode Control Scheme ...

A nonlinear terminal sliding mode controller is designed to guarantee finite-time high-precision convergence of the sliding surface and meanwhile to eliminate the effect of singularity. Moreover, an exponential approach law is used to accelerate the convergence rate of the system to the sliding surface.

Novel Fuzzy Neural Nonsingular Terminal Sliding Mode ...

A Novel Adaptive Terminal Sliding Mode Control of PKMs: Design and Real-Time Experiments Moussab Bennehar*, Gamal El-Ghazaly, Ahmed Chemori and François Pierrot Abstract—This paper presents a new adaptive controller based on terminal sliding mode (TSM) control for parallel manipulators. More precisely, the pro-

A Novel Adaptive Terminal Sliding Mode Control for ...

A novel recursive framework for designing terminal sliding mode (TSM) and fast terminal sliding mode (FTSM) with finite-time convergence is developed in this paper. The principle of finite-time convergence is investigated under these new formulations. The singularity problem around the origin with the previous TSM control can be resolved.

A Novel Recursive Terminal Sliding Mode with Finite-Time ...

A novel guidance law using integral terminal sliding

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mode with impact angle constraint. Abstract: The terminal guidance problem for missiles intercepting maneuvering targets with terminal impact angle constraints is investigated. A finite-time impact angle constraint guidance law is developed using the nonsingular integral terminal sliding mode control theory.

A novel guidance law using integral terminal sliding mode ...

A novel guidance law using fast terminal sliding mode control with impact angle constraints 1. Introduction. With the rapid development of missile technology in modern warfare, anti-aircraft missile, one of the... 2. Modeling of missile interception with impact angle constraints. A three dimension ...

A novel guidance law using fast terminal sliding mode ...

A singularity-free terminal sliding mode (TSM) control scheme with fast and fixed-time convergence for a class of second-order non-linear systems with matched uncertainties and external disturbances is proposed. A novel singularity-free fast TSM (SFTSM) structure is constructed and the upper-bound of convergence time is independent of initial states and can be set arbitrarily in advance.

IET Digital Library: On SFTSM control with fixed-time ...

High-performance control of inertial stabilization imaging sensors (ISISs) is always challenging because of the complex nonlinearities induced by friction, mass imbalance, and external disturbances. To overcome this

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problem, a terminal sliding mode controller (TSMC) based on a novel exponential reaching law (NERL) method with a high-order terminal sliding mode observer (HOTSMO) is suggested.

Terminal Sliding Mode Control with a Novel Reaching Law ...

First, a novel integral terminal sliding mode (ITSM) is designed such that the sliding motion realizes the action of a quaternion based nonlinear proportional derivative controller. More precisely, on the ITSM, the attitude dynamics behave equivalently to an uncertainty free system, and finite time convergence of the tracking error is achieved almost globally.

Adaptive fault tolerant spacecraft attitude control using ...

In this study, a novel Fault-Tolerant Control Methodology (FTCM) is developed for robot manipulators. First, to overcome singularity glitch and to enhance convergence time of conventional Terminal...

(PDF) A Novel Fault-Tolerant Control Method for Robot ...

A Novel Adaptive Terminal Sliding Mode Control of PKMs: Design and Real-Time Experiments

@inproceedings{Bennehar2016ANA, title={A Novel Adaptive Terminal Sliding Mode Control of PKMs: Design and Real-Time Experiments},

author={Mouss{\^a}b Bennehar and G. el-Ghazaly and A. Chemori and F. Pierrot}, year={2016} }

Figure 8 from A Novel Adaptive Terminal Sliding Mode

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In control systems, sliding mode control (SMC) is a nonlinear control method that alters the dynamics of a nonlinear system by application of a discontinuous control signal (or more rigorously, a set-valued control signal) that forces the system to "slide" along a cross-section of the system's normal behavior.

Sliding mode control - Wikipedia

A novel dynamic terminal sliding mode control eliminates the chattering problem by using dynamic terminal sliding mode surface. By using a function augmented sliding hyper-plane, it is guaranteed...

What are the benefits of using higher order controllers vs ...

By combining a recursive control methodology with a robust control algorithm, a finite-time adaptive integral backstepping fast terminal sliding mode control is designed for major control loops related to position tracking and attitude stabilization. To estimate quadrotor mass and inertia moments, only four adaptation laws are developed.

This book describes the advances and applications in Sliding mode control (SMC) which is widely used as a powerful method to tackle uncertain nonlinear systems. The book is organized into 21 chapters which have been organised by the editors to reflect the various themes of sliding mode control. The book provides the

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reader with a broad range of material from first principles up to the current state of the art in the area of SMC and observation presented in a clear, matter-of-fact style. As such it is appropriate for graduate students with a basic knowledge of classical control theory and some knowledge of state-space methods and nonlinear systems. The resulting design procedures are emphasized using Matlab/Simulink software.

"Advanced Sliding Mode Control for Mechanical Systems: Design, Analysis and MATLAB Simulation" takes readers through the basic concepts, covering the most recent research in sliding mode control. The book is written from the perspective of practical engineering and examines numerous classical sliding mode controllers, including continuous time sliding mode control, discrete time sliding mode control, fuzzy sliding mode control, neural sliding mode control, backstepping sliding mode control, dynamic sliding mode control, sliding mode control based on observer, terminal sliding mode control, sliding mode control for robot manipulators, and sliding mode control for aircraft. This book is intended for engineers and researchers working in the field of control. Dr. Jinkun Liu works at Beijing University of Aeronautics and Astronautics and Dr. Xinhua Wang works at the National University of Singapore.

Gathering 20 chapters contributed by respected experts, this book reports on the latest advances in and applications of sliding mode control in science and engineering. The respective chapters address applications of sliding mode control in the broad areas

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of chaos theory, robotics, electrical engineering, physics, chemical engineering, memristors, mechanical engineering, environmental engineering, finance, and biology. Special emphasis has been given to papers that offer practical solutions, and which examine design and modeling involving new types of sliding mode control such as higher order sliding mode control, terminal sliding mode control, super-twisting sliding mode control, and integral sliding mode control. This book serves as a unique reference guide to sliding mode control and its recent applications for graduate students and researchers with a basic knowledge of electrical and control systems engineering.

Provides comprehensive coverage of the most recent developments in the theory of non-Archimedean pseudo-differential equations and its application to stochastics and mathematical physics--offering current methods of construction for stochastic processes in the field of p-adic numbers and related structures. Develops a new theory for parabolic equat

This book reflects the latest developments in variable structure systems (VSS) and sliding mode control (SMC), highlighting advances in various branches of the VSS/SMC field, e.g., from conventional SMC to high-order SMC, from the continuous-time domain to the discrete-time domain, from theories to applications, etc. The book consists of three parts and 16 chapters: in the first part, new VSS/SMC algorithms are proposed and their properties are analyzed, while the second focuses on the use of VSS/SMC techniques to solve a

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variety of control problems; the third part examines the applications of VSS/SMC to real-time systems. The book introduces postgraduates and researchers to the state-of-the-art in VSS/SMC field, including the theory, methodology, and applications. Relative academic disciplines include Automation, Mathematics, Electrical Engineering, Mechanical Engineering, Instrument Science and Engineering, Electronic Engineering, Computer Science and Technology, Transportation Engineering, Energy and Power Engineering, etc.

Sliding mode control was first introduced in the 1950s. It is a nonlinear control technique with many unique properties. In this book, different aspects of SMC are explored. Chapters include new developments in research on a sliding mode governor for hydropower plants; integral sliding mode control (I-SMC) for a variable speed wind turbine system and a I-SMC method for load frequency control (LFC) of nonlinear power systems with wind turbines; the control of a stand-alone photovoltaic (PV) system; leader-follower-based formation control of a group of mobile robots; the application of Takagi-Sugeno (T-S) fuzzy model in coordinated control of multiple robots system; an induction motor speed control using the nonsingular terminal sliding-mode control method; adaptive nonsingular terminal sliding mode (NTSM) tracking control scheme based on backstepping design presented for Micro-Electro-Mechanical Systems (MEMS) vibratory gyroscopes; and a hybrid actuator and its control using a cascade sliding mode technique.

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This volume is dedicated to Professor Okyay Kaynak to commemorate his life time impactful research and scholarly achievements and outstanding services to profession. The 21 invited chapters have been written by leading researchers who, in the past, have had association with Professor Kaynak as either his students and associates or colleagues and collaborators. The focal theme of the volume is the Sliding Modes covering a broad scope of topics from theoretical investigations to their significant applications from Control to Intelligent Mechatronics.

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