2022 16th International Workshop on Variable Structure Systems (VSS 2022)

Rio de Janeiro, Brazil
11-14 September 2022

IEEE Catalog Number: CFP22437-POD
ISBN: 978-1-6654-6360-7

Copyright © 2022 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP22437-POD
ISBN (Print-On-Demand):	978-1-6654-6360-7
ISBN (Online):	978-1-6654-6359-1
ISSN:	2158-3978

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings .com

TABLE OF CONTENTS

First and Second Order Sliding Mode Equivalent Signals and Practical Approximability in the Implementation 1
Elisabetta Punta

On Equivalent Control Regeneration 6
Igor Boiko

Analysis of Oscillations in Homogenous Sliding Mode Controllers using the Locus of a Perturbed Relay System 9
Ahmed Rehan, Igor Boiko, Yahya Zweiri

On LMI-Based Algorithm for Strictly Positive Real Systems with Static Output Feedback 15
Marcelo C. M. Teixeira, Márcio R. Covacic, Ruberlei Gaino, Edvaldo Assunção, Rodrigo Cardim, Adalberto Z. N. Lazarini

Robust Switched State Feedback Design for Linear Uncertain Systems Subject to Disturbances 22
Flávio Andrade Faria, Mateus Aquila Barroso, Adalberto Zanatta Neder Lazarini, Edvaldo Assunção, Rodrigo Cardim, Marcelo Carvalho Minhoto Teixeira

The Invariance Control Approach to Sliding Regimes in Switched Systems: A Geometric Algebra Viewpoint. 29
H. Sira-Ramírez, M. A. Aguilar-Orduña, B. C. Gómez-León

Implementation of an Interpolated Model Reference Control Scheme 35
Liam Vile, Halim Alwi, Christopher Edwards

Robot Guidance and Control using Global Sliding Modes and Acceleration Velocity Obstacles 41
Jorge A. Ricardo, Davi A. Santos

From the Modified Smooth Sliding Control to the Super-Twisting Algorithm: UAV Trajectory Tracking Experimental Results 47
Wenderson Gustavo Serrantola, Fernando Lizarralde, Alessandro Jacoud Peixoto

Super-Twisting Sliding Mode Control with Adaptive Gain of Quadrotor with Rigid Manipulator 53
Hardy Azmir Bin Anuar, Franck Plestan, Abdelhamid Chriette, Olivier Kermorgant

Predefined-Time Sliding Mode Attitude Control for a Quadrotor Aerial Vehicle 59
João F. S. Trentin, Davi A. Santos

HOSM Output Feedback Control of Uncertain SISO Linear Plants 65
Emmanuel Cruz-Zavala, Jaime A. Moreno, Emmanuel Nuño

MIMO Super-Twisting Controller: A New Design 71
Juan F. García-Mathey, Jaime A. Moreno

A Third Order Semi-Implicit Homogeneous Differentiator: Experimental Results 77
Loïc Michel, Malek Ghanes, Yannick Aoustin, Jean-Pierre Barbot

Delayed Sliding Mode Observer Design for Linear Systems with Unknown Inputs and Measurement Delays 83
Jing Xu, Emilia Fridman, Leonid M. Fridman, Yugang Niu

Robust Artificial Delay Based Impedance Control of Robotic Manipulators with Uncertain Dynamics 89
Udayan Banerjee, Bhabani Shankar Dey, Indra Narayan Kar, Subir Kumar Saha

Analysis of Relay-Based Feedback Compensation of Coulomb Friction 95
Michael Ruderman, Leonid Fridman

Chattering is a Persistent Problem in Classical and Modern Sliding Mode Control 101
Liu Hsu, José Paulo V. S. Cunha

Binary Model Reference Adaptive Control Under Disturbances 109
Victor Hugo Pereira Rodrigues, Liu Hsu, Tiago Roux Oliveira

On Consistent Discretization of a Homogeneous 2-SM Controller 115
Andrey Polyakov, Denis Efimov, Xubin Ping

Autotuning of DC-DC Buck Converters using the Modified Relay-Feedback Test 123
Ahmed Shehada, A. R. Beig, Igor Boiko

On Stability of a Cascaded PI-SM Control DC-DC Boost Converter 129
Ayman Al Zawaideh, Igor Boiko

Electric Vehicle Charger Control Design Combining Phase Shift Modulation with an Adaptive Super Twisting Algorithm 135
Houssein Al Attar, Mohamed Hamida, Malek Ghanes, Miassa Taleb

Application of a Sensorless Control Based on Sliding Mode in Permanent Magnet Synchronous Machine using an Angular Error Extraction 141
Enrique Alvaro-Mendoza, Mohamed Assaad Hamida, Jesús De León-Morales, Malek Ghanes

Predefined-Time Control of 4D PMSM System using Linear Time-Varying Control Input 147
Nain De La Cruz, Michael Basin

Feasibility Analysis of a Class of High-Order Sliding-Mode Differentiators for Redox Flow Batteries Parameter Estimation 153
Pedro Fornaro, Thomas Puleston, Paul Puleston, Maria Serra-Prat, Ramon Costa-Castelló, Pedro Battaiotto

Robust Switched Controller Based on Takagi-Sugeno Fuzzy Model for DC-DC Converters Against Disturbances 159
Dante J. S. Oncoy, Rodrigo Cardim, Marcelo C. M. Teixeira, Edvaldo Assunçáo

Barrier Function Based-Adaptive Super-Twisting Algorithm for Floating Offshore Wind Turbine 166
Hedi Basbas, Hussein Obeid, Salah Laghrouche, Mickael Hilairet, Franck Plestan

Super-Twisting Control of Offshore Wind Turbine in Region III with Self-Tuning Adaptive Gains 172
Mohammad Javad Mirzaei, Mohamed Assaad Hamida, Franck Plestan

Adaptive Super-Twisting Algorithm Subject to Unbounded Disturbances Without a Priori Bounds 178
Jair Luiz De Azevedo Filho, Eduardo Vieira Leão Nunes

Adaptive Sliding-Mode Control for Perturbed Systems with Zero-Crossing Control Gains 184
Luis Ovalle, Leonid Fridman, Rafael Iriarte

Adaptive Super-Twisting Guidance Law: An Event-Triggered Approach 190
Sunil Kumar, Sandeep Kumar Soni, Ankit Sachan, Shyam Kamal, Bijnan Bandyopadhyay

Extremum Seeking and Sliding Mode Control Applied to Anti-Lock Braking Systems 196
Wallace R. Ferreira, Tiago Roux Oliveira, Andrei Battistel

Multivariable Sliding Mode-Based Extremum Seeking Control via Periodic Switching Function and Cyclic Search 202
Nerito Oliveira Aminde, Tiago Roux Oliveira, Liu Hsu

A Novel Finite-Time First-Order Sliding-Mode Unknown Input Observer with Certain Fixed-Time Convergence Characteristics 208
Alessandro Pilloni, Alessandro Pisano, Elio Usai

A Modified Super-Twisting Algorithm with Specified Settling Time 214
João F. Silva, Davi A. Santos

Predefined-Time Synchronization of Competitive Neural Networks via Continuous Time-Varying Control 219
Alison Garza-Alonso, Michael Basin, Pablo Rodriguez-Ramirez

Event-Triggered Sliding Mode Control to Manipulate a Microrobot with Two-Magnet System Under Input Constraint 225
Sandeep Kumar Soni, Zakaria El Hamdaoui, Siyuan Wang, Driss Boutat, Mohamed Djemai, Daniel Geha

Advances in Sliding Mode Control of Earthquakes via Boundary Tracking of Wave and Diffusion PDEs 231
Diego Gutiérrez-Oribio, Yury Orlov, Ioannis Stefanou, Franck Plestan

Sliding-Mode Controllers for Soil Moisture Modeled by Nonlinear Parabolic Partial Differential Equations 237
Jose Luis Huayanay Villar, José Paulo V. S. Cunha

Evaluation of Fractional-Order Sliding Mode Control Applied to an Energy Harvesting System 243
Julio Cesar C. Basilio, Tiago Roux Oliveira, José Geraldo T. Ribeiro, Americo Cunha

Novel Variable-Structure PD Controller for Satellite Attitude Control 249
Abdallah Alansaari, Igor Boiko, Sean Swei

Robust Adaptive Continuous Spacecraft Formation Control Accounting for Actuator Dynamics 254
Mason E. Nixon, Yuri B. Shtessel

Optimal Sliding Mode Control with Predefined Upper Bound of Settling Time 260
Vijay Kumar Singh, Parijat Prasun, Kallol Chatterjee, Shyam Kamal, Sandip Ghosh, Bijnan Bandyopadhyay

Stabilization of Continuous Time Uncertain Systems with Predefined Upper Bound of Settling Time 266
Shyam Kamal, Anil Kumar Pal, Bhawana Singh, Bijnan Bandyopadhyay, Xinghuo Yu

Arbitrary Pole Placement with Sliding Mode Control 272
Abhisek K. Behera, Bijnan Bandyopadhyay, Sarah K. Spurgeon

Explicit Euler Discretization of an Indirect Adaptive Sliding Mode Control 278
Christina Hettiger, Kiran Kumari, Lars Watermann, Lukas Eisenzopf, Florian Weissenberger, Martin Horn, Stefan Koch, Johann Reger, Markus Reichhartinger

New Switched Adaptive Controller for the Industrial Tanks 284
Samaherni Dias, Kurios Queiroz, Aldayr Araujo

A Sliding-Mode Fault Tolerant Control for Robotic Manipulators Based on Actuator Switching 290
Jinsong Zhao, Yan Lin, Lin Li

Author Index