

22nd IFAC Symposium on Automatic Control in Aerospace (ACA 2022)

IFAC-PapersOnline Volume 55, Issue 22

Mumbai, India
21-25 November 2022

Editors:

Bidyadhar Subudhi

ISBN: 978-1-7138-7350-1

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

To the extent permissible under applicable laws, no responsibility is assumed by the Owner, the Publisher or the Licensee for any injury and/or damage to persons or property as a result of any actual or alleged libelous statements, infringement of intellectual property or privacy rights, or products liability, whether resulting from negligence or otherwise, or from any use or operation of any ideas, instructions, procedures, products or methods contained in the material therein.

The publication of an advertisement in the POD Edition does not constitute on the part of the Owner, the Publisher or the Licensee a guarantee or endorsement of the quality or value of the advertised products or services described therein or of any of the representations or the claims made by the advertisers with respect to such products or services.

Copyright© (2022) by the authors
Open access publication under the CC-BY-NC-ND License
<https://creativecommons.org/licenses/by-nc-nd/4.0/>
All rights reserved.

Printed with permission by Curran Associates, Inc. (2023)

For permission requests, please contact the publisher, Elsevier Limited
at the address below.

Elsevier Limited
The Boulevard, Langford Lane
Kidlington
Oxford OX5 1GB UK

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
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

Open Wind Tunnel Experiments of the DarkO Tail-Sitter Longitudinal Stabilization with Constant Wind	1
<i>Florian Sansou, Fabrice Demourant, Gautier Hattenberger, Thomas Loquen, Luca Zaccarian</i>	
The Role of Closed-Loop Attitude Dynamics in Adaptive UAV Position Control.....	7
<i>Salvatore Meraglia, Marco Lovera</i>	
Quadrotor Composite Learning Neural Control with Disturbance Observer Against Aerodynamic Disturbances	13
<i>Luigi Manconi, Seyyed Ali Emami, Paolo Castaldi</i>	
Finite-Time Sliding Mode Attitude Control Design for a Coaxial Tilt-Rotor UAV	19
<i>Tianyu Feng, Longlong Chen, Zongyang Lv, Yuhu Wu</i>	
Geofencing for Optionally Piloted Aircraft Through Automatic Execution of Smooth Evasive Maneuvers	25
<i>Federico Pinchetti, Ole Pfeifle, Stefan Notter, Walter Fichter</i>	
Robust Control Based on Synergetic Theory for Transformable Quadrotor	31
<i>A. Belmouhoub, Y. Bouzid, S. Medjmadj, H. Siguerdidjane</i>	
Terminal Phase Descent Trajectory Optimization of Reusable Launch Vehicle.....	37
<i>Vijith Mukundan, Arnab Maity, Shashi Ranjan Kumar, U. P. Rajeev</i>	
Computation of Static Disturbances Experienced by a Launch Vehicle During the Flight	43
<i>Gopal Jee, Anish Antony, Kapil Kumar Sharma, V. Brinda, D. S. Sheela, V. R. Lalithambika</i>	
Constrained State Feedback Pole Placement of Coupled Lateral Plant Dynamics of RLV During the Reentry Phase	49
<i>Gopal Jee, Sam K. Zachariah, M. V. Dhekane, B. B. Das</i>	
Deep Reinforcement Learning and Simultaneous Stabilization-Based Flight Controller for Nano Aerial Vehicle	55
<i>Jinraj V. Pushpangathan, Harikumar Kandath, Bibin Francis</i>	
Space Robot Motion Control During Rendezvous and Visual Inspecting a Geostationary Satellite State	61
<i>Y. Somov, S. Butyrin, T. Somova, S. Somov</i>	
Pendulum Actuated Spherical Robot: Dynamic Modeling & Analysis for Wobble & Precession	67
<i>Animesh Singhal, Sahil Modi, Abhishek Gupta, Leena Vachhani, Omkar A. Ghag</i>	
Attitude Control for Fractionated Space Systems.....	73
<i>Andrew J. Miller, Frédéric Mazenc, Maruthi R. Akella</i>	
A Model Predictive Control Based Magnetorquer-Only Attitude Control Approach for a Small Satellite.....	79
<i>Mehmet Esit, Halil Ersin Soken, Chingiz Hajiyev</i>	
Relative Navigation and Terrain-Based Path Planning Using Flash LiDAR Based Surfel Grid Map for Asteroid Exploration	85
<i>B. Liu, K. Janschek</i>	

Mars Atmospheric Entry Guidance Using MPSP with State and Control Constraints	91
<i>Prayag Sharma, Radhakant Padhi</i>	
Quaternion Constrained Structured Adaptive Attitude Control	97
<i>Srianish Vutukuri, Radhakant Padhi</i>	
Flash LiDAR-Based Super-Resolution Mapping for Small Solar System Body Exploration	103
<i>Nora Konrad, Valerij Chernykh, Bangshang Liu, Klaus Janschek</i>	
Geometric Collision Avoidance Algorithm for Uncrewed Flight Vehicle	109
<i>Soumitra Ray, Sikha Hota</i>	
Experimental Validation of an Anti-Windup Design Trading off Position and Heading Direction Control Performance for Quadrotor UAVs	117
<i>Francesco Marzagalli, Pietro Ghignoni, Giovanni Gozzini, Davide Invernizzi</i>	
Software-In-The-Loop Validation of Super Twisting Based Sliding Mode Control for Quadcopters	123
<i>Asifa Yesmin, Kiran Kumari, Aseem Vivek Borkar, Arpita Sinha, Hemendra Arya</i>	
Online Evasive Strategy for Aerial Survey Using Sierpinski Curve	129
<i>Ashay Wakode, Arpita Sinha</i>	
Modified Super-Twisting Sliding Mode-Based Control Design for Robust Hovering of Quadrotor	135
<i>Kumar Abhinav, Shashi Ranjan Kumar</i>	
A Novel Approach for GNSS Signal Tracking Based on Sliding Mode Control.....	141
<i>Jitu Sanwale, Mangal Kothari, Suresh Dahiya, Hari Hablani</i>	
Nonlinear Model Predictive Control of Rotation Floating Space Robots for Autonomous Active Debris Removal	147
<i>Raunak Srivastava, Roshan Sah, Kaushik Das</i>	
On-Board Fault Diagnosis of a Laboratory Mini SR-30 Gas Turbine Engine.....	153
<i>Richa Singh, Arnab Maity, Bhagyashree Somani, P. S. V. Nataraj</i>	
Partial Feedback Linearized RISE Controller for Active Flutter Suppression	159
<i>Balraj Sharma, Pooja Agrawal, Ajay Misra</i>	
Adaptive Droop Control Design with Overcurrent Protection for Onboard DC Microgrids in Hybrid Electric Aircrafts.....	165
<i>Andrei-Constantin Braitor, Houria Siguerdidjane, Alessio Iovine</i>	
Employing NMPC Scheme Utilizing Improved Cubature Kalman Filter for an AUV System	171
<i>Parijat Bhowmick, Subhasish Mahapatra, Atanu Panda</i>	
Sliding Mode Control for a Non Linear 2 DoF Torsion System.....	177
<i>Swathy Sukumaran, P. S. Lal Priya, N. S. Shabnam</i>	
LQR-Based MIMO PID Control of a 2-DOF Helicopter System with Uncertain Cross-Coupled Gain	183
<i>Falguni Gopmandal, Arun Ghosh</i>	
Robust Time-Delayed PID Flight Control for Automatic Landing Guidance Under Actuator Loss- Of-Control	189
<i>Balaji Jayaraman, Vikram Kumar Saini, Ajoy Kanti Ghosh</i>	

Model Predictive Control and Higher Order Sliding Mode Control for Optimized and Robust Control of PMSM.....	195
<i>B. Shweta, V. Sadhana</i>	
Parameter Convergence in Adaptive Control in Presence of Unmatched Uncertainty.....	201
<i>Manish Patel, Arnab Maity</i>	
Characterization of Cubature Kalman Filter for GPS Delayed Environments in INS-GPS Integrated Navigation	207
<i>Megha Shaiju, S. Sreeja</i>	
Separate Guidance and Control Design for Autonomous Path-Following	212
<i>Saurabh Kumar, Shashi Ranjan Kumar, Abhinav Sinha</i>	
Range Parameterised Maximum Correntropy Unscented Kalman Filter for Two Dimensional Angles-Only Target Tracking Problems	218
<i>Asfia Urooj, Rahul Radhakrishnan</i>	
Airborne Multi Target Track to Track Fusion of Radar and IRST for Advanced Multi Role Combat Aircrafts.....	224
<i>Sanketh Ailneni, Sudesh Kumar Kashyap, V. P. S. Naidu, Amitabh Saraf, Nandan K. Sinha</i>	
Robust Collaborative 3D Target Localization Using UAVs with State Uncertainties	230
<i>M. Zagar, M. Kieffer, H. Piet-Lahanier, L. Meyer</i>	
Towards Secure Consensus of Multi-Agent Systems Via a Virtual Network and Heterogeneous Controller Gains	236
<i>P. N. V. Sai Pavan Kumar, Anoop Jain</i>	
A Hybrid Path Planning Approach Combining Artificial Potential Field and Particle Swarm Optimization for Mobile Robot	242
<i>Manny Shankar, Gangireddy Sushnigdha</i>	
Flight Guidance for Vision-Augmented Automatic Landing of Electric Vertical Take-Off and Landing Vehicles	248
<i>Christoph Krammer, Markus Rosenbauer, Florian Holzapfel</i>	
Optimal Route Design for an Airship Collecting and Delivering Logs in Difficult Environmental Conditions	255
<i>Benjamin Bouvier, Pierrick Pascal, Hélène Piet-Lahanier</i>	
A Game-Theoretic Model for One-on-One Air Combat.....	261
<i>Vivek Ramteke, Vinodhini Comandur, Venkata Ramana Makkapati, Mangal Kothari</i>	
Target Selection Algorithm for ASM Using Modified ICP for Terminal Phase Applications	268
<i>M. Bangi, N. Akilandeswari, G. Naresh Kumar</i>	
Bearing-Only Formation Control for Double Integrators in a Plane	275
<i>Susmitha T. Rayabagi, Debasattam Pal, Dwaipayan Mukherjee</i>	
Waypoint Navigation of Quadrotor Using Deep Reinforcement Learning.....	281
<i>K. Himanshu, Hari Kumar, Jinraj V. Pushpangathan</i>	
Anti-Saturation Finite Time Adaptive Altitude Quadrotor Control Under Unknown Disturbances	287
<i>Khelil S. Brahim, Ahmed El Hajjaji, Najiba Terki, David Lara</i>	

Boundary Surveillance Using a Novel Target Switching Technique	293
<i>Puneet Shrivastava, Twinkle Tripathy, Arpita Sinha</i>	
Cubature H_∞ Filter Based Simultaneous Localization and Mapping.....	299
<i>K. Aravind Kumar, Kumar Pakki Bharani Chandra</i>	
Towards Fast Nonlinear Model Predictive Control for Embedded Applications.....	304
<i>Vaishali Patne, Deepak Ingole, Dayaram Sonawane</i>	
Semantic Segmentation Based Mapping Systems for the Safe and Precise Landing of Flying Vehicles	310
<i>Harsimret Singh Dhani, Dmitry Ignatyev, Antonios Tsourdos</i>	
Fourier Series and Search Space Reduction Based Control Profiles for Reentry Trajectory Optimization.....	316
<i>Swapnil Srivastava, Deepak Mishra, Gangireddy Sushnigdha</i>	
Model Predictive Control of Connected Spacecraft Formation.....	322
<i>Somasundar Kannan, Parijat Bhowmick, Seyed Amin Sajadi Alamdari</i>	
Rendezvous and Docking of Co-Operative Target with Dual-Axis Gimbaled Electric Thruster	328
<i>Ankit M. Patel, Vikram Kumar Saini, Aishashwini, Shashi Ranjan Kumar, Dipak Kumar Giri</i>	
Attitude Control of a Low L/D Re-Entry Module with Multiple Equilibrium Points	334
<i>N. Soumya, A. P. Nair, Gopal Jee U. P. Rajeev, E. S. Padmakumar</i>	
A Hölder-Continuous Extended State Observer for Rigid Body Attitude Dynamics	340
<i>Ningshan Wang, Amit K. Sanyal</i>	
Attitude Control of a Rigid Satellite with Event-Triggered Sliding Mode	346
<i>Gargi Das, Nilanjan Patra, Rajiv Kumar Mishra</i>	
Structured Flocking for Fixed Wing Multiple Agents	352
<i>Vignesh Anand, Rohan Waghmare</i>	
Priority Tagged Artificial Potential Field Swarm Formation Control Through Narrow Corridors.....	358
<i>Aniket Sharma, Nandan K. Sinha</i>	
Containment Control of Heterogeneous Multi-Agent Systems	363
<i>K. Arjundas, Avinash K. Dubey, Dwaipayan Mukherjee</i>	
Bearing-Based Formation Tracking of Multi-UAV System Under Time-Varying Directed Interaction.....	369
<i>M. Jeslin Jacob, Ajul Dinesh, Ameer K. Mulla</i>	
Consensus-Based Formation Control Using a Novel Signed Protocol.....	375
<i>Sudhakar Tarra, Dwaipayan Mukherjee</i>	
Variants of Ekranoplanes Application at the Chemical Treatment of Agricultural Fields	381
<i>Alexander Nebylov, Vladimir Nebylov, Benzerrouk Hamza</i>	
Geometric Model Free Trajectory Tracking Control on $SE(3)$	387
<i>C. Zhao, L. Burlion</i>	
Identification of GPS Spoofing as a Drone Cyber-Vulnerability and Evaluation of Efficacy of Asynchronous GPS Spoofing	394
<i>M. Surendra Kumar, Gaurav S. Kasbekar, Arnab Maity</i>	

Design and Development of a Folding Mechanism for Bat-Like Bioinspired Wing.....	400
<i>Radha Lahoti, Abhijit Gogulapati, Prasanna Gandhi</i>	
Polynomial Shaping-Based Field-Of-View Constrained Impact Time Guidance Against Non- Maneuvering Targets	406
<i>Prajakta Surve, Arnab Maity, Shashi Ranjan Kumar</i>	
Barrier Lyapunov Function Based Impact Time Guidance with Field-of-View and Input Constraints	412
<i>Swati Singh, Shashi Ranjan Kumar, Dwaipayan Mukherjee</i>	
Design of Guidance Law with Predefined Upper Bound of Settling Time.....	418
<i>Sunil Kumar, Rahul Kumar Sharma, Shyam Kamal</i>	
Benchmark Study for Performance Impact of Seeker-Radome on Guidance Loop	424
<i>Srijan Tripathi, Arnab Maity, Shashi Ranjan Kumar</i>	

Author Index