

Unique and Transformational Flight Systems

Papers Presented at the AIAA SciTech Forum and Exposition
2022

San Diego, California, USA and Online
3 – 7 January 2022

ISBN: 978-1-7138-5421-0

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.

The contents of this work are copyrighted and additional reproduction in whole or in part are expressly prohibited without the prior written permission of the Publisher or copyright holder. The resale of the entire proceeding as received from CURRAN is permitted.

For reprint permission, please contact AIAA's Business Manager, Technical Papers. Contact by phone at 703-264-7500; fax at 703-264-7551 or by mail at 34922 Uwytkug'Xcmg{'Ftkxg.'Uwky'422, Reston, VA 20191, USA.

TABLE OF CONTENTS

EMERGING TECHNOLOGIES FOR ADVANCED AIR MOBILITY APPLICATIONS

Combined Passenger and Cargo Operations for Electrified Regional Air Mobility.....	1
<i>Cedric Y. Justin, Alexia P. Payan, Sidney C. Winfield, Laura A. Morejon Ramirez, Dimitri N. Mavris</i>	
Improved Hazard Analysis for Novel Vehicle Configurations Using the Systems-Theoretic Process Analysis.....	25
<i>Alex Markov, Mayank V. Bendarkar, Dimitri N. Mavris</i>	
The Design and Fabrication of a Load-Attenuating Launcher for Multiple Air-Launched UAS.....	39
<i>Philip Federico, Benjamin McDougall, Nikhil Patel, Matthew Paulton, William Pickell, John A. Pegues, James E. Bluman</i>	
Wind-Optimal Cruise Airspeed for a Multirotor Aircraft in Urban Air Mobility	53
<i>Priyank Pradeep, Todd A. Lauderdale, Heinz Erzberger, Gano Broto Chatterji</i>	
Dynamic Modeling and Analysis of Tilt-Wing Electric Vertical Take-Off and Landing Vehicles	66
<i>Marc S. May, Daniel Milz, Gertjan Looye</i>	

AIRCRAFT ELECTRIFICATION - TOOLS AND METHODS

Investigation of High-Frequency Rotary Transformer in Independent Speed Variable Frequency Generators in Aircraft Applications	86
<i>Jeremiah S. Vannest, Julia Zhang, Lijun Gao, Shengyi Liu</i>	
A Technique for Matching Propeller, Motor, and Airframe of an Electric Powered Aircraft Based on Efficiency Maps.....	94
<i>Hak-tae Lee</i>	
Powertrain Model Improvement for Hybrid-Electric Regional Aircraft	104
<i>Francesco Orefice, Valerio Marciello, Vincenzo Cusati, Fabrizio Nicolosi</i>	
A Study in Flight Efficiency for More Electric Aircraft by Thermodynamic Model of Turbofan Engines with Electric Generation	117
<i>Yotsugi Shibuya, Naoki Seki, Hitoshi Oyori</i>	

ELECTRIC AND HYBRID-ELECTRIC VTOL AIRCRAFT DESIGN

Sizing and Analysis of a Tilt-Wing Aircraft with All-Electric and Hybrid-Electric Propulsion Systems.....	128
<i>Imon Chakraborty, Noah S. Miller, Aashutosh A. Mishra</i>	
Design and Sizing of a Dual-Purpose Hybrid-Electric Ducted Fan Lift-Plus-Cruise Aircraft	158
<i>Imon Chakraborty, Aashutosh A. Mishra, Noah S. Miller, Dennis v. Dommelen, Willem A. Anemaat</i>	
Evaluating Demand of Emerging Urban Air Mobility Vehicles with Changing Cost.....	182
<i>Nick Gunady, Ethan Wright, Sai Mudumba, Brandon E. Sells, Hsun Chao, Daniel A. DeLaurentis</i>	

Application of Dynamic Simulation Tool Aeronomie to Quadcopter Control Selection	194
<i>Luke Heyerdahl, Nirmal Prabhakar, Dominik Karbowski, Phillip Sharer</i>	

URBAN AIR MOBILITY AND UNMANNED AERIAL VEHICLE NOISE I

Investigation into Aeroacoustic Rotor Scaling Effects for eVTOL Applications.....	205
<i>Matthew Walker, Daniel R. Cuppoletti</i>	
Rotor-Rotor Interaction Noise of Counter-Rotating Vs Co-Rotating Rotors for Air Mobility Applications.....	223
<i>Peter N. Sorensen, Daniel R. Cuppoletti</i>	
Numeric Modeling of the Noise Emission of a Pusher Propeller UAV Configuration	237
<i>Michael Schmähl, Sebastian Speck, Mirko Hornung</i>	

URBAN AIR MOBILITY AND UNMANNED AERIAL VEHICLE NOISE II

A Mid-Fidelity Numerical Framework for Efficient Prediction of Propeller-Wing Interaction Noise	261
<i>Maks J. Groom, Qiqi Wang, Beckett Yx Zhou</i>	
The Unsteady Wake Produced by a Coaxial Co-Rotating Rotor in Hover.....	276
<i>John A. Valdez, Charles E. Tinney</i>	
Second Generation UAM Community Noise Assessment Using the FAA Aviation Environmental Design Tool	291
<i>Stephen A. Rizzi, Menachem Rafaelof</i>	
Implications of Rotor-Rotor Interaction in Noise Generation of UAM Vehicles with Counter-Rotating Configurations	304
<i>Natalie Reed, Daniel R. Cuppoletti</i>	

Author Index