

Aviation Technology, Integration, and Operations Conference

(ATIO 2013)

Held at AIAA Aviation 2013

**Los Angeles, California, USA
12-14 August 2013**

Volume 1 of 3

ISBN: 978-1-62993-206-4

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 1801 Alexander Bell Drive, Reston, VA 20191, USA.

TABLE OF CONTENTS

Volume 1

AIRSPACE CONFIGURATION (FORMERLY OASIS)

An Approach for Finding Multiple Area of Specialization Configuration Advisories.....	1
<i>Michael J. Bloem, Nicholas Bamboz</i>	
An Evaluation of Operational Airspace Sectorization Integrated System (OASIS) Advisory Tool	20
<i>Paul U. Lee, Richard H. Mogford, Wayne Bridges, Nathan Buckley, Mark Evans, Vimmy Gujral, Hwasoo Lee, Daniel Peknik, William Preston</i>	

DRAG REDUCTION

Curious Circumstances Surrounding Optimal Non-Planar Wings.....	54
<i>Timothy T. Takahashi, Christopher T. Kady</i>	
A Unified Perspective of Business Jet Cruise Drag.....	78
<i>Neal J. Pfeiffer</i>	
Improved Computation of Induced Drag for Wakes of Arbitrary Shape.....	92
<i>David J. Pate, Brian German</i>	

SIMULATION OF AIRPORT OPERATIONS

Ramp Operation Model Based on Observation in Hartsfield-Jackson Atlanta Airport	105
<i>Sang Hyun Kim, Alex Proal, Eric Feron</i>	
Validation of Simulations of Airport Surface Traffic with the Surface Operations Simulator and Scheduler.....	113
<i>Robert D. Windhorst, Justin V. Montoya, Zhifan Zhu, Sergei Gridnev, Katy Griffin, Aditya Saraf, Steve Stroiney</i>	
More Input - Generic Data for Microscopic Airport Simulation.....	128
<i>Tim Alers, Sebastian Kellner, Axel Classen</i>	
Platform as a Service (PaaS) as an Alternative for Commercial Aviation Applications.....	133
<i>Paul G. Mallasch, Benson Miller, John Schramm</i>	

SOFTWARE IN AVIATION

Intellectual Property Law and Legacy FORTRAN Code.....	149
<i>Timothy T. Takahashi</i>	
The Benefit of Innovative Taxi Concepts: The Impact of Airport Size, Fleet Mix and Traffic Growth	159
<i>Niclas M. Dzikus, Richard Wollenheit, Martin Schaefer, Volker Gollnick</i>	

SURFACE CONGESTION

Study on the Hybrid Power Source Concept of Unmanned Aircraft Systems.....	175
<i>Jan Leuchter, Vitezslav Stekly</i>	

UNMANNED AIR SYSTEMS: PERFORMANCE

What Makes Unmanned Aircraft Systems so Complex to Certify for Civil Operations?	191
<i>Laurence H. Mutual</i>	
Use of the Convective Weather Avoidance Polygon (CWAP) to Identify Temporally Coherent Convective Storm Boundaries	203
<i>Mikhail Rubnich, Michael Matthews, Richard Delaura</i>	

WEATHER: ANALYSIS

Identifying Representative Weather-Impact Scenarios for Flow Contingency Management	213
<i>Shin-Lai (Alex) Tien, Christine P. Taylor, Craig R. Wanke</i>	
How Much Delay Does New York Inject into the National Airspace System? A Graph Theory Analysis.....	226
<i>Marcos E. Bolanos, Daniel Murphy</i>	

AIR TRAFFIC MANAGEMENT I

Similar Days in the NAS: An Airport Perspective	237
<i>Shon R. Grabbe, Banavar Sridhar, Avijit Mukherjee</i>	
ETA Forecasting and Shadow Mode Concepts for the National Airspace	251
<i>George Hunter</i>	
Enumeration of National Airspace System Uncertainties Within an Agent-based, State-based Model.....	261
<i>Steven J. Landry, Julian Archer</i>	
A Micro-Economic Model of Airline Choice of Airfare and Aircraft Size in the Presence of Changing Energy Costs	274
<i>Lance Sherry, George Donohue, Karla Hoffman</i>	

AVIATION ECONOMICS

Making the Case for NextGen Concepts—Using the FAA Benefit-Cost Analysis Methodology	285
<i>Amit Lagu, Suzanne Akkoush, Annie Cheng, William Dunlay</i>	
Estimation of Airline Benefits from Avionics Upgrade Under Preferential Merge Re-sequence Scheduling	294
<i>Tatsuya Kotegawa, Charlene Cayabyab, Noam Almog, Olga Agafonova</i>	
Finance-related Flows Within an ANSP: A Generic Modeling Approach in System Dynamics	306
<i>Michael Kreuz</i>	
Feasible Time Range Analysis of Wide Fleet for Continuous Descent Arrival.....	317
<i>Sang Gyun Park, John-Paul Clarke</i>	

DESCENT AND ARRIVALS I

Air-Ground Trajectory Predictions during Required Time of Arrival Operation	332
<i>David Gouldey, Roland M. Sgorcea, William Symionow</i>	
Developing an On-Board Traffic-Aware Flight Optimization Capability for Near-Term Low-Cost Implementation	348
<i>David J. Wing, Mark G. Ballin, Stefan Koczo, Robert A. Vivona, Jeffrey Henderson</i>	

FLIGHT MANAGEMENT I

Effect of LNAV and VNAV Equipage on Time-Based Scheduling.....	361
<i>Veera V. Vaddi, Xiaoli Bai, Monish D. Tandale</i>	
Performance Comparison of Interval Management Concepts Using an Optimization-Based Scheduler in Terminal Airspace.....	381
<i>Minseok Ryu, Jae-Hoon Song, Seongim Choi</i>	

TERMINAL: PERFORMANCE

Estimating Secondary Delay Effects for New York Area Departures	407
<i>James Dearmon, Micheal Klinker, Hilton Bateman, Daniel Greenbaum, Amal Srivastava</i>	
A Model for Investigating the Interaction Between Go-Arounds and Runway Throughput	414
<i>John Shortle, Lance Sherry</i>	
Real-Time Air Traffic Flow Estimation for Improved Situational Awareness in the Terminal Area	423
<i>Bongjun Yang, Padmanabhan K. Menon</i>	
Trajectory Prediction via Modeling Vectored Area Navigation Arrivals	443
<i>Sungkwon Hong, Keunjin Lee</i>	

TRAJECTORY I

Emergency Flight Replanning for Minimum Loss of Life Risk Using a Decoupled Trajectory Optimization Approach.....	453
<i>Rafael Fernandes De Oliveira, Christof Büskens</i>	
Minimising Overall Fuel Usage with Optimum Scheduling of User Preferred Trajectories.....	467
<i>Paul Simon, Cees Bil</i>	
Effects of UAS-Specific Capacity Constraints on Delays and Aircraft Encounters.....	475
<i>Chunki Park, Hak-Tae Lee</i>	

UNMANNED AIR SYSTEMS: MANAGEMENT

A Systems-Based Approach to Functional Decomposition and Allocation for Developing UAS Operational Concepts.....	484
<i>Seung Man Lee, Eric R. Mueller</i>	
Challenges to Producing Standards for the Integration of Unmanned Aircraft Systems in the NAS	502
<i>Laurence H. Mutual</i>	
GPS Outage Impacts on the National Airspace System.....	511
<i>Michael C. Wambsganss, Paul Casas</i>	

AIR TRAFFIC MANAGEMENT II

Analysis and Modeling of Miles-in-Trail Restrictions in the National Airspace System	524
<i>Kapil Sheth, Sebastian Gutierrez-Nolasco, Julien Petersen</i>	
Space Transition Corridors in the National Airspace System	536
<i>Karl D. Bilmoria, Michael Jastrzebski</i>	
Finding Airspace Efficiencies by Pivoting Technology Implementation in Air Traffic Management.....	547
<i>Scott P. Young</i>	
Choosing Descent Flight-Path Angles for Small Jets: Case Study for the JFK Airport	554
<i>Minghong G. Wu, Steven Green</i>	

DESCENT AND ARRIVALS II

Identifying Airport Opportunities for Increased Use of Delayed Deceleration Approaches.....	572
<i>Yari Rodriguez, Tom Reynolds, Joseph C. Venuti, R John Hansman, Jean-Marie Dumont</i>	
Incentivizing Aircraft Equipment Upgrade Through Preferential Merging: A Phoenix Case Study	582
<i>Noam Almog, Tatsuya Kotegawa</i>	
The Application of the Extreme Value Distribution to Network Traffic Assessment	594
<i>James Wilder</i>	

ECONOMICS AND THE VALUE CHAIN

Air Navigation in Eastern Poland based on EGNOS	603
<i>Janusz Cwiklak, Adam Ciecko, Marek Grzegorzewski, Stanislaw Oszczak, Henryk Jafernik</i>	
Design and Evaluation of LNAV/VNAV Guidance Algorithms for Time-of-Arrival Error Characterization	613
<i>Xiaoli Bai, Sai Vaddi, Yiyuan Zhao</i>	

FLIGHT MANAGEMENT II

Low Calculation Time Interpolation Method on the Altitude Optimization Algorithm for the FMS CMA-9000 Improvement on the A310 and L-1011 Aircraft	634
<i>Roberto Felix Patron, Ruxandra M. Botez, Dominique Labour</i>	
Speed and Altitude Optimization on the FMS CMA-9000 for the Sukhoi Superjet 100 Using Genetic Algorithms.....	643
<i>Roberto Felix Patron, Adrien Charles Oyono Owono, Ruxandra M. Botez, Dominique Labour</i>	
Dynamic Terminal Airspace Configuration	652
<i>William D. Hall, Andrew Churchill, Inseok Hwang, Panta Lucic</i>	

TERMINAL: ANALYSIS

Modeling and Simulation Tools for Analysis of Terminal Airspace Operations.....	680
<i>Monish D. Tandale, Jason Kwan, Sydney Lin, Veera V. Vaddi</i>	
An Integer Programming based Sector Design Algorithm for Terminal Dynamic Airspace Configuration.....	699
<i>Jian Wei, Vincent J. Sciandra, Inseok Hwang, William D. Hall</i>	
Benefit Analysis of a Sector Design Algorithm for Terminal Dynamic Airspace Configuration.....	716
<i>Vincent J. Sciandra, Jian Wei, Inseok Hwang, William D. Hall</i>	
Controller Strategies for Automation Tool Use under Varying Levels of Trajectory Prediction Uncertainty.....	741
<i>Susan Morey, Thomas Prevôt, Joshua M. Kraut, Nancy Bienert, Lynne Martin, Joey Mercer, Christopher Cabrall, Sarah Hunt, Jeffrey Homola</i>	

TRAJECTORY II

Performance of an Adaptive Trajectory Prediction Algorithm for Climbing Aircraft	755
<i>Young S. Park, David P. Thippavong</i>	
Algorithms of FMS Reference Trajectory Synthesis to Support NextGen Capability Studies	769
<i>Yiyuan Zhao, Sai Vaddi</i>	
Conceptual Design and Cost Estimate of a Subsonic NASA Testbed Vehicle (NTV) for Aeronautics Research	788
<i>Craig L. Nickol, Peter Frederic</i>	

AIRCRAFT CONCEPTUAL DESIGN I

Development of a Real-Time Capable Integrated Aircraft Model for Test, Integration, and Development Support.....	807
<i>Clare Savaglio</i>	
Comparison of Two Business Jets - Usage and Flight Loads	814
<i>Kamran Rokhsaz, Linda K. Kliment, Alhambra L. Yee, Edward M. Weinstein</i>	
Evaluation of a Dynamic Taxi-time Estimation Model Using Process-based Segmentation in an A-CDM Environment	824
<i>Xavier Sogno, Paul C. Roling, Remco Maan, Richard Curran</i>	

AIRPORT SURFACE SCHEDULING

Wheels-Off Time Estimation at Non-ASDE-X Equipped Airports	832
<i>Gano Broto Chatterji, Yun Zheng</i>	
Analysis of Airport Surface Schedulers Using Fast-Time Simulation.....	851
<i>Justin V. Montoya, Robert D. Windhorst, Steve Stroiney, Katy Griffin, Aditya Saraf, Zhifan Zhu, Sergei Gridnev</i>	
Recommendations for NextGen Airport Surface Traffic Scheduling Algorithms: A Fast-time Simulation-based Perspective	869
<i>Aditya Saraf, Katy Griffin, Steve Stroiney, Robert D. Windhorst, Valentino Felipe</i>	
Distributed Environment Experiment for NextGen	883
<i>Scott Doucett</i>	

CREATIVE NEXT GENERATION AVIATION SYSTEMS

A Framework for Verification and Validation of Complex Aerospace Systems	887
<i>Wilson N. Felder</i>	
Application of Game Theoretic Models to Evaluate Airline Equipage Dynamics of NextGen Technologies	892
<i>Juan J. Alonso, Philippe A. Bonnely, James Bono, Alice Fan, Dominic McConnachie, Brendan D. Tracey, David Wolpert, Dongping Xie, Greg Raiffa</i>	

Assessing the Impact of a Carbon Tax Policy on Commercial Aviation and National Airspace System Performance.....	910
<i>Simon Tsao, Seli Agbosu-Amison, Jack McQueston, Glenn Foster, Anuja Mahashabde, Shane Martin</i>	

Volume 2

Operating Cost Estimation for Electric-Powered Transport Aircraft	922
<i>Kay O. Ploetner, M. Schmidt, D. Baranowski, A. T. Isikveren, M. Hornung</i>	

ELECTRIC AIRCRAFT: DESIGN AND PERFORMANCE

Development of a Sizing and Analysis Tool for Electrohydrostatic and Electromechanical Actuators for the More Electric Aircraft	934
<i>Imon Chakraborty, David Jackson, David R. Trawick, Dimitri Mavris</i>	
Electric Control Surface Actuator Design Optimization and Allocation for the More Electric Aircraft.....	951
<i>Imon Chakraborty, David R. Trawick, David Jackson, Dimitri Mavris</i>	
Effects of Technology R&D Investments on System Level Performance.....	968
<i>Holger Pfaender, Hernando Jimenez, Dimitri N. Mavris</i>	

ENVIRONMENT AND DESIGN I

Implication of Tanker Mission Concept on the Benefits Evaluation of a Civil Air-to-Air Refuelling Transport System	979
<i>Richard McRoberts, Juliana M. Early, Fabian Morscheck, Mark A. Price, Bernd Korn</i>	
Next Generation Civil Transport Aircraft Design Considerations for Improving Vehicle and System-Level Efficiency.....	989
<i>Diana M. Acosta, Mark D. Guynn, Richard A. Wahls, Ruben Del Rosario</i>	
Aircraft Production - Ecological Assessment in the Pre-design Stage.....	1004
<i>Marco Weiss, Volker Gollnick</i>	
A Usage-Based Analysis Method for Predicting Fleet Fuel Savings Due to Aircraft Improvements	1014
<i>Lance V. Bays, Kevin E. Halpin</i>	

FUEL BURN I

Commercial Airline Speed Optimization Strategies for Reduced Cruise Fuel Consumption.....	1026
<i>Luke Jensen, R. John Hansman, Joseph C. Venuti, Tom Reynolds</i>	
New Method for Aircraft Fuel Saving Using Flight Management System and Its Validation on the L-1011 Aircraft	1039
<i>Jocelyn Gagne, Alejandro Murrieta, Ruxandra M. Botez, Dominique Labour</i>	
The Impact of Fuel Price on Airline Fuel Efficiency and Operations	1049
<i>Dominic McConnachie, Christoph Wollersheim, R. John Hansman</i>	
Telepresence as a Transportation Mode	1063
<i>Yuri Gawdiak, David Ballard</i>	

JPDO: OUTLOOK AND RESPONSE STRATEGIES

Integrated Future World Generation System	1079
<i>Yuri Gawdiak</i>	
On-Demand Mobility (ODM): A Discussion of Concepts and Required Research.....	1104
<i>Marc Narkus-Kramer</i>	
A New Compressibility Correction Method to Predict Aerodynamic Interaction between Lifting Surfaces	1114
<i>Roelof Vos, Fulco Vaessen</i>	

AERODYNAMICS

Theoretical and Experimental Investigation of Leading Edge Tubercles on the Wing Performance	1134
<i>Irelyn Fernandes, Yogesh Sapkota, Tania Mammen, Atif Rasheed, Calvin Rebello, Young H. Kim</i>	
Boundary Layer Transition due to Free Stream Particles - A Simple Experimental Approach	1175
<i>Conny Schmidt, Trevor M. Young, Emmanuel Benard, Lei Zhao</i>	
Ce-Liner - Case Study for eMobility in Air Transportation	1184
<i>Mirko Hornung, Askin T. Isikveren, Mara Cole, Andreas Sizmann</i>	

AIRCRAFT CONCEPTUAL DESIGN II

Conceptual Design and Sizing of an Amphibian Transport Aircraft.....	1195
<i>Mayank V. Bendarkar, Rajkumar S. Pant, Scott Eberhardt</i>	
Design and Shape Optimization of Morphing Winglet for Regional Jetliner	1203
<i>Mengmeng Zhang, R. K. Nangia, Arthur W. Rizzi</i>	
Weight and Fuel saving Potential Through Changed Cabin and Fuselage Design	1215
<i>Joerg C. Fuchte, Björn Nagel, Volker Gollnick</i>	
Overview of the Multipurpose Aircraft Simulation Laboratory Experience.....	1232
<i>Mario Cassaro, Paolo Gunetti, Manuela Battipede, Piero Gili</i>	

CONFLICT RESOLUTION I

Coded-Light Attitude Transmission for Collision Avoidance.....	1241
<i>Frederik Meysel, Frank Morlang</i>	
Investigating Effects of Well Clear Definitions on UAS Sense-and-Avoid Operations	1252
<i>Seung Man Lee, Chunki Park, Marcus A. Johnson, Eric R. Mueller</i>	
Supersonic Diversions - Assessment of Great-Circle versus Sonic Boom-Restricted Flight Routing	1267
<i>Bernd Liebhardt, Florian Linke, Katrin Dahlmann</i>	

ENROUTE AND MISSION OPTIMIZATION I

Generic Airspace Research.....	1280
<i>Paul U. Lee, Richard H. Mogford, Wayne Bridges, Vimmy Gujral, William Preston</i>	
DNL Contour Error Quantification for Operations Scaling in Context of Varying Fleet Distribution	1286
<i>Jose Enrique Bernardo, Benjamin Havrilesko, Matthew J. Levine, Michelle Kirby, Dimitri N. Mavris</i>	
Optimization of End-Around Taxiway for Efficient Operations and Environmental Benefits.....	1300
<i>Tiffany T. Le, Karen Marais</i>	

ENVIRONMENT AND DESIGN II

Assessing the Environmental Benefits of NextGen Improvements in the National Airspace System.....	1315
<i>Paul M. Truong, Joseph A. Post</i>	
Investigation of Benefits and Impacts of Aircraft Design Cruise Speed Reductions on Airlines Operations and Economics	1325
<i>Philippe A. Bonnefoy, Alice Fan</i>	
The Clean Sky Technology Evaluator Information System	1340
<i>Muriel Brunet, Rémi Lafage, Sébastien Aubry</i>	

ENVIRONMENTAL TECHNOLOGY IN AIRCRAFT OPERATIONS

Scenario Development to Evaluate System-wide Environmental Benefits of Aircraft Technologies and Concepts	1348
<i>Christopher Frank, Hernando Jimenez, Holger Pfaender, Dimitri N. Mavris</i>	
Environmental and Economic Impacts of Advanced Aircraft Operations Technologies on a Duopolistic Airline Model	1369
<i>Ryan P. Foley, William A. Crossley, Satadru Roy</i>	

Study of Resource Constraints and Environmental Performance Objectives in Pareto-Optimal Aircraft Technology Portfolios	1389
<i>Hernando Jimenez, Christopher Acuff, Dimitri N. Mavris</i>	
The Impact of Trajectory Prediction Uncertainty on Air Traffic Controller Performance and Acceptability	1407
<i>Joey Mercer, Nancy Bienert, Ashley Gomez, Sarah Hunt, Joshua M. Kraut, Lynne Martin, Susan Morey, Steven Green, Thomas Prevôt, Minghong G. Wu</i>	

UNCERTAINTY IN ATM I

Methodology for Calibration of ANGIM Subjected to Atmospheric Uncertainties.....	1426
<i>Matthew J. Levine, Abhay Kaul, Jose Enrique Bernardo, Michelle Kirby, Dimitri N. Mavris</i>	
Optimization of Integrated Departures and Arrivals Under Uncertainty	1439
<i>Min Xue, Shannon Zelinski</i>	
4D Trajectory Optimization in the Presence of Uncertainty.....	1449
<i>Yoshinori Matsuno, Takeshi Tsuchiya</i>	
High Altitude Hot Rod - An Energy Efficient N+1 Transport.....	1460
<i>Timothy T. Takahashi, Troy Reed, Michael Jaksa, Jesse Gomez</i>	

AIRCRAFT CONCEPTUAL DESIGN III

Platform Design for Fleet-Level Efficiency under Uncertain Demand: Application for Air Mobility Command (AMC)	1486
<i>Jung Hoon Choi, Parithi Govindaraju, Navindran Davendraingam, William A. Crossley</i>	
Multi-Disciplinary Design of an Advanced Narrow-Body Transport Aircraft	1505
<i>Christopher Gedeon, Shane Huffer, Timothy T. Takahashi</i>	
Advanced Single-Aisle Transport Propulsion Design Options Revisited	1532
<i>Mark D. Guynn, Jeffrey J. Berton, Michael J. Tong, William J. Haller</i>	
Optimising Oil-Cooler Duct Position for a Pusher Type Turboprop Aircraft	1549
<i>Premkumar Pottanam Selvarajan, C. Senthilkumar, Elangovan Srinivasan, Baskar Chakravarthy</i>	

AIRCRAFT SUBSYSTEM PERFORMANCE

The Liebherr Fully Integrated FCS Design - A Case Study.....	1564
<i>Guido Weber, Tim Lammering, Sven Thierer, Peter Schaedler, Georg Ried, Tom Schneider</i>	
Exploratory Study of Interoperability Between Tactical and Strategic Separation Assurance Functions	1576
<i>David P. Thippavong</i>	

CONFLICT RESOLUTION II

Analysis of Traffic Conflicts in a Mixed-Airspace Evaluation of Airborne Separation Assurance	1590
<i>Timothy A. Lewis</i>	
A Study of Conflict Resolution Timeliness and Impact of Horizontal Maneuver Parametric Settings.....	1602
<i>Carl J. Pankok, Confesor Santiago</i>	
Considerations for Developing the Improved Collision Avoidance System	1612
<i>Sarah R. Arnac, Karen Marais, Seth Kreissler, Mark Skoog, David Sizoo</i>	
Impact of Cleveland Center Jet Route Changes on Airspace Metrics.....	1628
<i>Michael C. Drew, Karl D. Bilimoria, Michael Jastrzebski, Mark Evans</i>	

ENROUTE AND MISSION OPTIMIZATION II

Incorporating Fleet Assignment with Aircraft Allocation to Measure Fleet-Level Metrics.....	1642
<i>Isaac J. Tetzloff, William A. Crossley</i>	
Diagnostic Tool for Throughput Factor Analysis in En-route Airspace	1652
<i>Sanghyun Shin, Jayaprakash Suraj Nandiganahalli, Inseok Hwang</i>	

Proof-of-Concept of a Networked Validation Environment for Distributed Air/Ground NextGen Concepts	1673
<i>James Grisham, Natalie Larson, Justin Nelson, Joshua Reed, Marvin Suggs, Yiannis Papelis, Mark G. Ballin</i>	
An Approach for Aeroacoustic Footprint-Modeling of Low Altitude Platforms by Means of Time Domain System Identification.....	1684
<i>Sebastian Speck, Julian Wilberg, Mirko Hornung</i>	

ENVIRONMENT AND DESIGN III

Determining Aviation Technology Goals Related to Noise Impacts: How Much Is Enough?	1700
<i>Terence R. Thompson, Charles Murphy, Donovan Johnson</i>	
Noise Analysis and Negotiation Tool for Terminal RNP Procedure Design	1708
<i>Hongseok Cho, Mark Azzam, R. John Hansman, Luke Jensen</i>	
Attitude Determination of an Aircraft Using Global Navigation Satellite System: Design, Simulation and Analysis	1720
<i>Najam Abbas Naqvi, Khayyam Masood, Lv Meibo, Zhang Wei</i>	
Uncertainty and Decision Making in Air Traffic Management.....	1733
<i>Hayley Reynolds, Richard Delaura, Joseph C. Venuti, Marilyn Wolfson</i>	

UNCERTAINTY IN ATM II

Upper and Lower Bound Estimation of Runway Throughput in the Presence of Uncertainty	1743
<i>Su W. Bae, John-Paul Clarke</i>	
Uncertainty Analysis of Integrated Departures and Arrivals: A Los Angeles Case Study.....	1753
<i>Min Xue, Shannon Zelinski, Daniel G. Mulfinger</i>	
A Risk Management Analysis Process: Modeling Terrorism Risk to the Aviation Industry	1763
<i>Gary Kamsickas, Christopher A. Forgie</i>	

CASE: MAKING THE BUSINESS CASE FOR MODEL BASED ENGINEERING

Massively Parallel Optimal Solution to the Nationwide Traffic Flow Management Problem	1781
<i>Monish D. Tandale, Sandy Wiraatmadja, Veera V. Vaddi, Joseph L. Rios</i>	

AIR TRAFFIC MANAGEMENT AND FLOW

Analysis of AFP Route-Outs in Preparation for CTOP Post-Implementation Assessment.....	1794
<i>Steven Kamine, Shin-Lai (Alex) Tien, Wayne Cooper</i>	
Exploring Design Trade-offs for Strategic Flow Planning	1802
<i>Craig R. Wanke, Christine P. Taylor</i>	
A Probabilistic Collocation Method Based Approach for Optimal Strategic Air Traffic Flow Management under Weather Uncertainties	1820
<i>Yi Zhou, Yan Wan, Craig R. Wanke, Christine P. Taylor, Sandip Roy</i>	
Calculating Capacity of Dependent Runway Configurations: A Discrete-event Simulation Approach for Analysing the Effect of Aircraft Sequencing	1834
<i>Joey Klugt, Paul C. Roling, Rob Ten Hove, Richard Curran</i>	

Volume 3

AIRPORT CAPACITY ANALYSIS

Simulation-Based Airport Capacity Estimation.....	1843
<i>Krishnakumar Ramamoorthy, George Hunter</i>	
Capacity Variation Algorithms for Simulation Modeling and Performance Analysis.....	1857
<i>Amy Chow, John Guldling</i>	
Forecasting Weather-Impacted Airport Capacities for Flow Contingency Management: Advanced Methods and Integration.....	1875
<i>Rahul Dhal, Sandip Roy, Christine P. Taylor, Craig R. Wanke</i>	

Identification of Present-Day Transport Pilot Workflow and Derivation of Mobile Aids.....	1887
<i>Theo Hankers, Peter Hecker, Nima Barraci, Jens Schiefele</i>	

HUMAN FACTORS IN AVIATION

Compression of PIREPs for Throughput-Limited Transmission	1898
<i>Joseph L. Rios, Miguel De La Cruz</i>	
How do Air Traffic Controllers Use Automation and Tools Differently During High Demand Situations?.....	1913
<i>Joshua M. Kraut, Joey Mercer, Susan Morey, Jeffrey Homola, Ashley Gomez, Thomas Prevôt</i>	
Pilot Subjective Assessments during an Investigation of Separation Function Allocation Using a Human-In-The-Loop Simulation.....	1925
<i>Kelly A. Burke, David J. Wing, Timothy A. Lewis</i>	
Modal Preference Modeling of Transportation Demand and Supply for Strategy Portfolio Analyses - Results and Future Plans	1944
<i>Yuri Gawdiak, James Herriot, Bruce J. Holmes, Bruce K. Sawhill, Jeremiah Creedon, Jeremy Eckhouse, Dou Long, David Ballard</i>	

JPDO: METHODS AND RESULTS

Future National Airspace System Architecture Evaluation: Methods and Initial Results	1969
<i>Jeremy Eckhouse, Dou Long, Robert V. Hemm, Jeremiah Creedon, Monica S. Alcabin, Frederick Wieland, Terry Thompson, David Ballard, Charles Murphy, Nathan Dickerson</i>	
Analyzing the Business Case and Economic Viability of Unmanned Aircraft Systems within the Nation's Airspace.....	1985
<i>Benjamin Litvinas, Nathan Dickerson</i>	
Predicting Future Unmanned Aerial System Flights.....	1998
<i>Frederick Wieland, Rohit Sharma, Derek Watulak</i>	
Initial System Integrity Assessment for Safety: Methods and NGOps-4 Results	2006
<i>Shane D. Bertish, Stephen Darr, Robert V. Hemm, Yuri Gawdiak, Patricia Swenor, Nathan Dickerson, Jose Tejeda</i>	
A Trajectory Management Strategy for Nonconforming Flights and Multi-Agent Separation Assurance	2026
<i>Confesor Santiago</i>	

SEPARATION ASSURANCE

Paving the Way to Free Flight - ASAS Separation in the Upper European Airspace	2038
<i>Helge Lenz, Christoph Möhlenbrink, Eliana Haugg</i>	
Coordination Between Multiple Ground-Based Separation Assurance Agents	2046
<i>Todd A. Lauderdale, Tony Wang</i>	
A Refined Method for Wing Weight Estimation and A New Method for Wing Center of Gravity Estimation	2056
<i>Wanbo Liu, Willem A. Anemaat</i>	

STRUCTURAL DESIGN & ANALYSIS

Aerostructural Design Optimization of a 100-Passenger Regional Jet with Surrogate-based Mission Analysis.....	2090
<i>Rhea P. Liem, Charles A. Mader, Edmund Lee, Joaquim Martins</i>	
High Speed Mobility through On-Demand Aviation	2114
<i>Mark D. Moore, Kenneth H. Goodrich, Jeff Viken, Jeremy Smith, Bill Fredericks, Toni Trani, Jonathan Barraclough, Brian German, Michael Patterson</i>	

TRANSFORMATIONAL FLIGHT ADVANCED I

A Multifunctional Rotor Concept for Quiet and Efficient VTOL Aircraft (AIAA 2013-4374).....	2141
<i>Alex M. Stoll, Edward V. Stilson, Joeben Bevirt, Pranay Sinha</i>	

Geographical Weather-Impact Sourcing: Analytical and Data-Driven Approaches.....	2147
<i>Sandip Roy, Yan Wan</i>	

WEATHER: IMPACT I

Optimization of the European Air Traffic During Grímsvötn Eruption in 2011 Based on Advanced Volcanic Ash Forecast	2160
<i>Ruzica Vujasinovic, Angela R. Schmitt, Julia Zillies, Vilmar Mollwitz, Christiane Edinger, Alexander Kuenz</i>	
Using Flight Information to Improve Weather Avoidance Predictions	2169
<i>Tim Stewart, James Dearmon, David Chaloux</i>	
Foundations of a Technology Assessment Technique Using a Scenario-Based Fleet System Dynamics Model	2178
<i>Niclas P. Randt</i>	

ENROUTE AND MISSION OPTIMIZATION III

Probabilistic and Coordinated Traffic Flow Management Optimization	2188
<i>Aditya Saraf, George Hunter, Krishnakumar Ramamoorthy, Gaurav M. Nagle, Kevin Cheng</i>	
Agent-Based Modeling and Simulation of Emergent Behavior in Air Transportation	2204
<i>Soufiane Bouarfa, Henk Blom, Richard Curran, Mariken Everdij</i>	
Discovery of Abnormal Flight Patterns in Flight Track Data.....	2220
<i>Bryan Matthews, Ashok N. Srivastava, John Schade, David R. Schleicher, Kennis Chan, Richard Gutterud, Mike Kiniry</i>	
Fuel Burn and Emissions Evaluation for a Missed Approach Procedure Performed by a B737-400.....	2229
<i>Radu Dancila, Ruxandra M. Botez, Steven Ford</i>	

FUEL BURN II

Benefit Analysis of NASA Terminal Arrival Spacing and Scheduling Tools.....	2247
<i>Alex S. Huang, Andrew Trapani, Sebastian D. Timar, Daniel W. Howell, Douglas Slocum, James Poage, Paul U. Lee</i>	
Estimated Fuel Burn Performance for MDW Arrivals	2261
<i>Akshay Belle, Lance Sherry</i>	
Evaluation of Formation Flight as a Fuel Reduction Strategy Given Realistic Flight Dispatching Constraints	2277
<i>Craig E. Hange</i>	
Profit Motivated Airline Fleet Allocation and Concurrent Aircraft Design for Multiple Airlines	2301
<i>Parithi Govindaraju, William A. Crossley</i>	

PLATFORM AND FLEET DESIGN METHODS

Coupled Optimization of Aircraft Design and Fleet Allocation with Uncertain Passenger Demand	2320
<i>Peter W. Jansen, Ruben E. Perez</i>	
Framework for Sustainability-Driven Aircraft Design	2338
<i>Katharina Franz, Kristof Risse, Eike Stumpf</i>	
Quantifying Uncertainty Across Fidelity Levels in the Design of Aerospace Systems	2358
<i>Jason Thomas, Jeremy S. Agte, Edward Alyanak, Jose Camberos</i>	
Benefits Assessment for Tactical Runway Configuration Management Tool.....	2371
<i>Rosa M. Oseguera-Lohr, Nipa Phojanamongkolkij, Gary W. Lohr, James W. Fenbert</i>	

RUNWAY EFFICIENCY

Sensitivity of NASA's Spot and Runway Departure Advisor to Traffic Forecast Errors.....	2384
<i>Stephen C. Atkins, Andrew Churchill, Brian J. Capozzi</i>	
Decision Support for Optimal Runway Reconfiguration	2398
<i>Xiaoli Bai, Padmanabhan K. Menon</i>	
Predictability in Airport Surface Operation Management	2413
<i>Yi Liu, Mark Hansen, Ziyi Wang, Gautam Gupta, Waqar A. Malik</i>	

SAFETY IN SURFACE OPERATIONS

Analysis of Runway Incursion Data	2423
<i>Lawrence L. Green</i>	
Comparison of Actual and Projected Safety Impacts of Surface Automation.....	2441
<i>Daniel W. Howell, Inna Flanders</i>	
Numerical Investigation of Fuselage Boundary Ingestion Propulsion Techniques	2454
<i>Alaa A. Elmiligui, William J. Fredericks, Mark D. Guynn, Richard L. Campbell</i>	

TRANSFORMATIONAL FLIGHT ADVANCED II

Classification of Days Using Weather Impacted Traffic in the National Airspace System	2472
<i>Avijit Mukherjee, Shon R. Grabbe, Banavar Sridhar</i>	

WEATHER: IMPACT II

Spatio-Temporally Correlated Wind Uncertainty Model for Simulation of Terminal Airspace Operations	2483
<i>Veera V. Vaddi, Monish D. Tandale, Sydney Lin, Prasenjit Sengupta</i>	
Improved Estimation of Average Annual Aircraft Delay for Variable Wind / Weather Conditions and Runway Configurations Using Queuing Theory	2498
<i>Amit Lagu, Annie Cheng, Suzanne Akkoush, Bill Dunlay</i>	
Assessing Wind Impacts on Flight Interval Management Performance	2504
<i>Melanie Sandberg, Tom Reynolds, Michael McPartland, Seth Troxel, Yan Glina</i>	
Usage and Flight Loads Analysis of King Airs in USFS Service.....	2514
<i>Linda K. Kliment, Kamran Rokhsaz, John Nelson, Brent Terning, Edward M. Weinstein</i>	

AIRCRAFT SUBSYEM SAFETY

A Top Level Safety Analysis of N+2 Aircraft in NextGen Operations	2523
<i>Virginia L. Stouffer, Robert V. Hemm</i>	
Bird Strike Warning System.....	2531
<i>Emre Aydogan, Rifat Edizkan</i>	
An Approach for Estimating System-Wide Environmental Benefits of Future Air Traffic Management Concepts	2544
<i>Anuja Mahashabde, William Baden, James Dearmon, Justin Field, Glenn Foster, Jennifer Harding, Koffi Amefia, David Hechtman, Fred Bankert</i>	

ENVIRONMENT EFFICIENCY

Assessment of Notional CO₂ Certification Standard Applicability Requirements for Future Commercial Aircraft	2556
<i>Michelle Kirby, Dongwook Lim, Taewoo Nam, Graham A. Burdette, Bryan Boling</i>	
System-level Environmental and Operational Assessment of Future Aviation Concepts and Technologies	2571
<i>Terry Thompson, Bruno Miller, John DiFelici, Meghan Hunt, Maryam Zavareh, Stephen Augustine</i>	
Civil Aeroengine Health Management and Maintenance Decision Support System: Development and Application	2593
<i>Xu-Yun Fu, Shi-Sheng Zhong, Ji-Ming Zhu</i>	

POWERPLANT PERFORMANCE

Aircraft Engine Performance Study Using Flight Data Recorder Archives	2600
<i>Yashovardhan S. Chati, Hamsa Balakrishnan</i>	
Methodology for Sizing and Performance Assessment of Hybrid Energy Aircraft	2612
<i>Clément Pernet, Corin Gologan, Patrick C. Vratny, Arne Seitz, Oliver Schmitz, Askin T. Isikveren, Mirko Hornung</i>	
Effect of Solidity on the Generation of Entropy in a Low Reynolds Number Compressor Cascade	2632
<i>Shigeo Hayashibara, Roy Y. Myose, Foo Kok</i>	

Applying Systems Engineering Management Tools for Assessment of Complex Product Development of Modern General Aviation Piston Airplanes	2657
<i>Venkatesan Sundararajan</i>	

SYSTEMS ENGINEERING

Systems Engineering Design - An Educational Imperitive for Future Aerospace Development.....	2665
<i>Armand J. Chaput</i>	
Control of Future Air Traffic Systems via Complexity Bound Management.....	2678
<i>Natalia Alexandrov</i>	

TRANSFORMATIONAL FLIGHT: AUTONOMY AND AIRSPACE

Personal Plane Automated Operations Strategy.....	2687
<i>Claude Le Tallec, Antoine Joulia, Jean-François Gabard, Moshe Harel</i>	
Improving Performance of Flying Wing Mini-UAV with Propeller Thrust Involved Trimming the Pitching Moment.....	2697
<i>Gang Wang, Yu Hu, Chao Wu, Bifeng Song</i>	

UNMANNED AIR SYSTEM DESIGN

Submersible Unmanned Aerial Vehicle Concept Design Study.....	2712
<i>Xingbang Yang, Tianmiao Wang, Jianhong Liang, Guocai Yao, Wendi Zhao</i>	
Analysis of Excess Wake Vortex Separation on Arrival Delay.....	2724
<i>Kevin E. Witzberger, John E. Robinson III</i>	

WAKES

Dynamic Wake Vortex Separation According to Weather Conditions	2742
<i>Naoki Matayoshi</i>	
A New Concept for Wake Vortex Hazard Mitigation Using On-Board Measurement Equipment.....	2757
<i>Thomas Feuerle, Meiko Steen, Peter Hecker</i>	
Author Index	