

51st Israel Annual Conference on Aerospace Sciences 2011

**Tel-Aviv and Haifa, Israel
23-24 February 2011**

Volume 1 of 2

ISBN: 978-1-61782-401-2

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.

Copyright© (2011) by the Faculty of Aerospace Engineering, Technion - Israel Institute of Technology
All rights reserved.

Printed by Curran Associates, Inc. (2011)

For permission requests, please contact the Faculty of Aerospace Engineering, Technion - Israel Institute of Technology at the address below.

Faculty of Aerospace Engineering
Technion - Israel Institute of Technology
Kiryat Technion, Haifa 32000, Israel

iacas@technion.ac.il

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

VOLUME 1

PLENARY SESSIONS

1st Josef Singer Memorial Lecture - Composite Materials - From Spacecraft to Symphony Halls.....	N/A
<i>George Spinger</i>	
1st Plenary Lecture - Israeli Civil Aviation - Status and Prospects.....	N/A
<i>Giora Romm</i>	
2011 Von Karman Lecture - Micro Air Vehicles with Fluidic Control.....	N/A
<i>Anthony Leonard</i>	
2nd Plenary Lecture - Basic Theory of Airplane Noise	N/A
<i>Marvin Goldstein</i>	
3rd Plenary Lecture - Estimating Grid-Induced Errors in CFD Solutions	N/A
<i>Tom Shih</i>	
4th Plenary Lecture - Advances in Micropropulsion and Nanoenergetics.....	N/A
<i>Richard Yetter</i>	

AERODYNAMICS I

Marangoni Instability of a Liquid Layer in an Unsteady Temperature Field.....	1
<i>Mickey Weidenfeld, Itzhak Frankel</i>	
Grouping Dynamics of Particles/Droplets in Oscillating Flows.....	24
<i>Itamar Hite, Michal Ruzal, Eran Sher, David Katoshevski</i>	
Influence of Step Configuration on Supersonic Turbulent Flow in Base Region	32
<i>Marat Goldfeld, Natalia Fedorova, Julia Zakharova</i>	

AERODYNAMICS II

Sound Generated by Convected Turbulence Past an Elastic Airfoil.....	47
<i>Avshalom Manela</i>	
The Effect of Shear on the Evolution of a Bouyant Vortex	57
<i>S. Tewner, G. Alon, Jacob Cohen, I. G. Shukman</i>	

AEROELASTICITY

Application of the Levenberg-Marquard Algorithm to Aeroelastic Problems	69
<i>Guy Mortchelewicz</i>	
Static Aeroelastic Analysis of a Complex Wing-Body Configuration using CFD.....	85
<i>Tatiana Zarutskaya, Tomer Rokita</i>	
Flutter Characteristics of Asymmetric F-16 Configurations	97
<i>Dan Michaels, I. Gur, I. Malkine, O. Dattner</i>	

AERONAUTICAL DESIGN I

Compact Heat Exchangers Design and Manufacturing TAT Technologies Overview	114
<i>Tomer Hashmonay</i>	
Health and Usage Moinitoring of Aging Helicopter Structure Using Fiber Bragg Grating Sensor Net.....	144
<i>Ido Kressel, J. Balter, S. Evenhaim, H. Leibovich, S. Kedem, N. N. Y Shemesh, B. Glam, D. Gruskeiwicz, S. Gali, M. Tur</i>	
Thermographical Helium Leak Detection in Aerostat Maintenance.....	146
<i>Sergy Stepura, Mickey Weidenfeld, Alex Klitsky, Benny Glam, Dan Gruskeiwicz</i>	

AERONAUTICAL DESIGN II

IAI Conversion of B747-400PAX/Combi Airplanes to Special Freighter Systems Modification	164
<i>Ilan Berlowitz, Natalia Melnichansky</i>	
IAI B767 Conversion Programs - Systems Modifications	177
<i>Ilan Berlowitz, Lyonel Khalifa</i>	
Wrinkles - 'Minor' Defects with Major Effects	189
<i>Victor Weissberg, Antony Green, Hila Mey-Paz</i>	
A PZT Actuated Millimeter Scale Flapping-Wing	194
<i>Ofer Rozen, Tali Nachmias, Shmuel Kaldor, Irit Peleg, Gabriel Smith, Christopher Kroninger, Jeffrey Pulskamp, Ronald Polcawich, Daniel Wiehs</i>	

AEROSPACE SYSTEMS ENGINEERING

All/More Electric Aircraft Engine & Airframe Systems Implementation	205
<i>Ilan Berlowitz, Natalia Melnichanskaya</i>	
Environmental Control Systems for All-Electric Aircraft	234
<i>Ilan Berlowitz, Natalia Melnichanskaya</i>	
UAV Dynamic Tail Angle Limiter for Icy Conditions	274
<i>Dan Israel Malta, Roy Mor</i>	
Cooperative Radar Range Deception Using Unmanned Air Vehicles	285
<i>Ashwini Ratnoo, Tal Shima</i>	

AIRBORNE SYSTEM DESIGN

IAI's Freighter Conversions Cargo Smoke Detection Systems	298
<i>Ilan Berlowitz, Lyonel Khalifa</i>	
A Scheme for Capturing Conceptual Design Processes	315
<i>Alexander Shihmanter, Ehud Kroll</i>	

AIRBREATHING PROPULSION

Development of a Lab-Scale Gel Fuel Ramjet Combustor	332
<i>Alexander Kuznetsov, Yair Solomon, Doron Har-Lev, Benny Natan</i>	
Analysis of Performance of Small Centrifugal Compressor Measured at Altitude Test Facility	344
<i>Ella Berlowitz, Savely Khosid, Yeshayahou Levy</i>	
On the Rotating Stall Phenomenon in Axial Compressors	353
<i>Liana Kartvelishvili, Yeshayahou Levy, Detlev Wulff</i>	
Mathematical Modelling of Turbine Setting of Engines and Plants	372
<i>A. Mansurova, A. P. Tunakov, A. S. Khamzin</i>	

CFD – TECHNOLOGIES AND APPLICATIONS I

A Weakly Realizable Scheme for Reynolds-stress Models	382
<i>Yair Mor-Yossef</i>	
Effect of Turbulence Modeling on the Subsonic Flow inside and near a Weapons-Bay	405
<i>Tomer Rokita, Rimon Arieli, Yuval Levy</i>	
Enriched Finite Element Methods for the Solution of Large Scale Aero-acoustic Problems	446
<i>Ido Gur, Dan Givoli</i>	

CFD – TECHNOLOGIES AND APPLICATIONS II

Validation of a Partial Zonal RANS Equations Solution Method in a Chimera Based Solver	455
<i>Michael Iovnovich, Motti Adar</i>	
CFD Based Correction of Wind Tunnel Errors Due to Balance Bending Effects	473
<i>Alon Zameret, V. Komkov, M. Adar</i>	
Optimizing Floating Canards Simulation in CFD Analysis	480
<i>Roni Wislizky, L. Hamelnick, M. Adar</i>	

COMBUSTION AND REACTIVE FLOWS

Propagation of Lean Premixed Polydisperse Spray Flames	490
<i>Leonid Kagan, Barry J. Greenberg, Gregory Sivashinsky</i>	
Application of a New Approach To the Analysis of Premixed Spray Flames	500
<i>Gershon Kats, J. B. Greenberg</i>	
Study of Free Radicals Injection as a Way to Increase Combustion Stability in Dry Low NOx Combustors	515
<i>Yeshayahoy Levy, Vladimir Erenburg, Valery Sherbaum, Vitaly Ovcharenko, Leonid Rosentsvit, Boris Chudnovsky, Amiel Herszage, Alexander Talanker</i>	
A Detailed Model of a Sooting, Laminar Methane-air Diffusion Flame	521
<i>Victor Chernov, S. B. Dworkin, Q. Zhang, M. J. Thomson</i>	

FLIGHT DYNAMICS AND PERFORMANCE EVALUATION

Dynamic Response of Hydraulic Lag Dampers	529
<i>Itzhak Shiroky, Felix Ilie, Arik Palitsky, Yakov Ben-Shushan, Uriel Gabay, Yossi Yoresh</i>	
Optimal In-Flight Modifications of Ballistic Missile Trajectories	542
<i>Erez Druckmann, J. Z. Ben Asher</i>	

FLOW CONTROL I

Application of Flow Control to Increase Energy Harvesting of Small Wind Turbines at Low Winds	569
<i>Maor-Hai Avnaim, Avraham Seifert</i>	
On the Feasibility of Reducing Trailing Edge Noise by using Active Flow Control	589
<i>O. Stalnov, Avraham Seifert, T. Miloh, A. Wolf, Th. Lutz</i>	
Transitory Aerodynamic Flow Control of Dynamic Stall	600
<i>George Woo, Ari Glezer</i>	

VOLUME 2

Low Aspect Ratio Wing Flow Control at MAV Reynolds Numbers	614
<i>Stefan Vey, David Greenblatt, Christian Oliver Paschereit</i>	

FLOW CONTROL II

Flow Interactions of Finite Span Synthetic Jets and a Cross-Flow	625
<i>Joseph Vasile, Yossef Elimelech, Michael Amitay</i>	
Stabilization of a Tethered Cube using Dielectric Barrier Discharge Plasma Actuation	647
<i>Snir Goyta, David Greenblatt</i>	
Recovery of Lost Performance due to Premature Transition by AFC	660
<i>Victor Troshin, Avraham Seifert</i>	

GUIDANCE, NAVIGATION AND CONTROL

New Control Architecture for High Performance Autopilot	679
<i>Ilan Rusnak, Haim Weiss</i>	
A Relay-Rover Differential Game	697
<i>Y. Choi, Meir Pachter, D. Jacques</i>	
Model Predictive Control for Scalar Linear Systems with Cauchy Noises	725
<i>Moshe Idan, Jason L. Speyer, Javier Fernandez</i>	
Tracking Maneuvering Targets with a Soft Bound on the Number of Maneuvers	739
<i>Daniel Sigalov, Yaakov Oshman</i>	

MISSILE GUIDANCE

Bounds on the Miss of a Multiple Model based Terminal Guidance Law	755
<i>Ilan Rusnak</i>	
Proportional Navigation Miss-Distance	781
<i>Shaul Gutman</i>	
Differential Games Miss-Distance in Noisy Environment	797
<i>Shaul Gutman, O. Goldan</i>	
Optimal Guidance Law for an Accelerating Exo-Atmospheric Interceptor Missile	813
<i>Daniel Reisner, T. Shima</i>	

ROCKET PROPULSION

Investigation of Metal Hydride Influence on Aluminum Agglomeration	833
<i>Gelena Stepura, Valery Rosenband, Alon Gany</i>	
Aluminum Agglomeration in Metallized Solid Propellants	843
<i>Yinon Yavor, Alon Gany, Merrill W. Beckstead</i>	
Evaluation of the Mechanical Properties of a mixed HTPB-Paraffin Hybrid Rocket Fuel	855
<i>Lubov Marvina, Vladimir Marvin, Benny Natan</i>	

SOLID MECHANICS

Special Finite Element Formulations Based on Asymptotic Thin Layer Models	874
<i>Clara Sussmann, Dan Givoli, Yacov Benveniste</i>	
Substantiating Fatigue Lives of Structural Components Using a Weibayes Statistical Distribution	886
<i>Abraham Brot</i>	
Modeling and Analysis of Piezoelectric Actuator in Practical Mechanism	896
<i>Shaul Eliahou Niv, D. Levy, D. Oster</i>	

SPACE SYSTEMS

The N-Train Concept	912
<i>Meidad Pariente, Noah Brosch, Yoav Yair</i>	
Formation Flying Control Using Line Of Sight Measurements	933
<i>Danna Linn Barnett, Moshe Guelman</i>	
CAMILA Hall Thruster Modeling Using A 2D PIC Simulation	951
<i>Igal Kronhaus, Alexander Kapulkin, Benveniste Natan, M. Guelman</i>	

SPACECRAFT ATTITUDE DETERMINATION AND CONTROL

Minimal Configuration Attitude Control for Nano Satellite	970
<i>Shay Mualem, Dov Verbin</i>	
Spacecraft Attitude Estimation via Stochastic H_∞ Filtering	984
<i>Lotan Cooper, Daniel Choukroun, Nadav Berman</i>	
Fault-tolerant Spacecraft Attitude Determination via Conditionally-linear Filtering	1012
<i>Eran Gershon, Daniel Choukroun</i>	

STRUCTURAL DYNAMICS

Structural Modal Analysis Based on Free Flight Vibration Response Data Only	1031
<i>Arie Elka, Zeev Sherf, Ilan Satt, Igor Sofer, Philip Hopstone</i>	
Bird Impact on Aircraft Leading Edge: Test vs. FEM	1045
<i>Esther Feldman, Gila Ghilai, Adrian David</i>	
Gust Loads for Aircraft Design with Nonlinear Aerodynamics	1052
<i>Alex Shousterman, M. Karpel, D. Raveh</i>	

Inflatable Lethality Enhancer Mechanism for Hit To Kill Exo-atmospheric Interceptor Dynamic Behavior	1070
<i>Moshe Trester</i>	

STUDENT COMPETITION

Batmobile - AIAA DBF Contest 2010 Student Project	1078
<i>M. Raviv, A. Geva, L. Lavi, T. Fridman, Y. Perelshtain, I. Spector, Y. Shaki, Ofer Dagan, S. Tsach</i>	
The SABRES Project: Constellation of Microsatellites for Automated Meter Reading and Other Non-Real Time Communication Services	1116
<i>Semion Semionov, Gregory Koushmir, Yuval Wiesel, Alex Pianin, Anastasia Korolyov, Maxim Belozerkovsky, Sarah Morgenstern, Jacob Herscovitz, Fred Ortenberg</i>	
MAROM – High Altitude Platform for Wind Power Generator	1150
<i>E. Aronhime, Z. Baratz, A. Ben-Neriah, L. Bernstein, E. Carmel, P. Davidovich, H. Garih, A. Gerassi, Sophie Greenberg, Z. Jaraczewer, I. Kadushin</i>	

TRAJECTORY DESIGN AND NAVIGATION

Sensor Transfer Function Imperfection Effect on Sculling Motion Errors in Strapdown Inertial Navigation Systems	1170
<i>Iliia Rapoport, Amit Brandes</i>	
Integrating Task and Motion Planning for Unmanned Aerial Vehicles	1181
<i>Matthew Cons, T. Shima, C. Domshlak</i>	
Pseudo-Spectral-Method Based Optimal Glide in the Event of Engine Cut-Off	1201
<i>Joseph Ben-Asher, M. K. Dekel</i>	
Path Following of Curved Trajectories Revisited	1219
<i>Isaac Yaesh, Carmit Heller</i>	
Author Index	