

Technion Israel Institute of Technology

48th Israel Annual Conference
on Aerospace Sciences
2008

February 27-28, 2008
Tel Aviv & Haifa, Israel

Volume 1 of 3

Printed from e-media with permission by:

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

ISBN: 978-1-60560-127-4

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

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© (2008) by the Faculty of Aerospace Engineering, Technion - Israel Institute of Technology
All rights reserved.

Printed by Curran Associates, Inc. (2008)

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

Technion Israel Institute of Technology

48th Israel Annual Conference
on Aerospace Sciences
2008

TABLE OF CONTENTS

VOLUME 1

Aeroelastic and Aerothermoelastic Analysis of Hypersonic Vehicles - A Multidisciplinary Challenge	1
<i>P. Friedmann, J. McNamara</i>	
Calculation of Aircraft Noise Pollution Using a Fictitious Source Method.....	56
<i>I. Gur, D. Givoli</i>	
Incorporation of Fictitious Surfaces into Aircraft Geometry for Aerodynamic Shape Optimization.....	77
<i>S. Peigin, B. Epstein</i>	
Aeroelastic Simulation of Morphing Flight Vehicles.....	94
<i>M. Karpel, E. Selitrennik, Y. Levy</i>	
Volterra Series and Reduced Model of Unsteady Aeroelastic Forces	113
<i>G. Mortchelewicz</i>	
Gust Loads on Transport Aircraft with Nonlinear Control System	130
<i>M. Karpel, E. Presente, L. Anguita, C. Maderuelo, H. Climent</i>	
BACT Aeroelastic Model - Closed-Loop Active Flutter Suppression Including Disturbance Rejection, With Bounded Control.....	148
<i>Z. Adin, J. Ben-Asher</i>	
Aircraft Interiors Design Approach and Future Trend	185
<i>I. Berlowitz</i>	
Fuel Cell Propulsion for All-Electric and More-Electric Aircraft and the ENFICA-FC Project	224
<i>Z. Shavit</i>	
Geometry Reverse Engineering: An Efficient Tool for Non-CAD Geometry Integration.....	250
<i>Y. Retter</i>	
A New Approach to the Development of an Airborne Generic-Telemetry System and the Research of an Advanced - Optimum Distributed Wideband Command Response Bus	261
<i>Z. Sar-Shalom</i>	
Semi-Analytical Study of the Effect of Earth's Precession on Geosynchronous Satellites	269
<i>S. Belyanin, P. Gurfil</i>	
Geostationary Satellite Collocation using Relative Orbital Element Corrections.....	289
<i>I. Beigelman, P. Gurfil</i>	

Testing the Orbit Determination Algorithm by the Satellite Laser Ranging Measurements	313
<i>A. Shiryaev</i>	
Centralized Cooperative UAV Motion Planning for Tracking in Urban Environments	322
<i>V. Shaferman, T. Shima</i>	
Cooperative Control of Unmanned Aerial Systems	341
<i>G. Goncalves, J. Sousa, F. Pereira</i>	
Integrated Task Assignment and Path Planning for Cooperating UAVs Using Genetic Algorithms	358
<i>E. Edison, T. Shima</i>	
Coordination and Communication of Cooperative Parafoils for Humanitarian Aid	379
<i>P. Gurfil, S. Feldman, M. Feldman</i>	
Efficient Optimization of Functions Computed Through Monte-Carlo Simulations	416
<i>B. Kaminer</i>	
Linear Hyper-Quadratic Pursuit - Evasion Games	427
<i>C. Heller, I. Yaesh, J. Ben-Asher</i>	
Optimal Sensor Threshold Control for Autonomous Search and Attack Munitions	439
<i>R. Roasario, M. Pachter, D. Jacques</i>	
Improved Material Exploitation of Composite Airframe Structures by Accurate Simulation of Collapse - The COCOMAT Project.....	458
<i>R. Degenhardt, K. Rohwer, D. Wilckens, J. Tessmer</i>	
Failure in CFRP L-Stiffened Panel Sections under Postbuckling Loads	464
<i>A. Orifici, A. Kotler, H. Abramovich, I. Herszberg, T. Weller</i>	
Effect of the Repetition of a Post-Buckling Load on CFRP Curved Panels.....	477
<i>P. Cordisco, C. Bisagni</i>	
Experiments to Detect the Damage Progress of Axially Compressed CFRP Panels Under Cyclic Loading	495
<i>D. Wilckens, R. Degenhardt, M. Kepke, B. Hildebrandt, K. Rohwer, J. Tessmer, A. Gleiter</i>	
Experimental and Analytical Investigation of Failure and Failure Progression in Composite Pull-off Specimens	503
<i>H. Reimerdes, S. Busing</i>	
Metamodels for Optimum Design of Composite Stiffened Structures under Torsion Loading	507
<i>K. Kalnins, C. Bisagni, H. Abramovich, P. Cordisco, E. Eglitis, R. Rikards</i>	
Turbulent Flow Predictions using a Cartesian Flow Solver	514
<i>Y. Kidron</i>	

VOLUME 2

On the Positivity, Convergence and Stagnation Point Anomaly of K-E Turbulence Models	533
<i>Y. Moryossef</i>	
CFD Code for Reactive Real Gas.....	553
<i>S. Yaniv, H. Wirzberger, O. Peles</i>	

DSMC Simulation: Validation and Application to Subsonic Gas Flows.....	571
<i>T. Ewart, J. Firpo, I. Graur, P. Perrier, J. Meolans, S. Seror</i>	
Extension and Validation of NES vs. IAI Blow-Down Cold Hypersonic Wind-Tunnel including High Angle of Attack Hypersonic Generic Missile CFD Prediction.....	600
<i>S. Seror, R. Werner, A. Levinger, R. Shabtay, J. Hefets</i>	
Aerobatic Business Jet Inlet Design Using CFD Analysis	642
<i>D. Such, N. Katzir, G. Hoffmann</i>	
Aerodynamic Design of Double-Slotted Fowler Flap for Acrobatic Aircraft Javelin	653
<i>M. Steinbuch, S. Marom, E. Gabriel, A. Koshorok</i>	
Practical UAVs Propeller Installations Design - IAI's Approach	673
<i>G. Hoffmann, T. Rubin, D. Field</i>	
Control of a Fin Stabilized High Spinning Projectile.....	695
<i>R. Shalil</i>	
Redundant Attitude Control System for the Unpowered 3rd Stage of the Shavit Launcher	704
<i>M. Klots, M. Goldstein, A. Kahane, Y. Levy</i>	
Evaluation of Unmanned Rotary Air Vehicle Handling Qualities using a Simple Simulator.....	721
<i>L. Zivan</i>	
Examination of Out-of-Plane Deformation in Three-Dimensional Interface Crack Problems.....	737
<i>N. Konovalov, L. Banks-Sills</i>	
The Damage-Tolerance Behavior of Integrally Stiffened Metallic Structures.....	747
<i>A. Brot, Y. Peleg-Wolfin, I. Kressel, Z. Yosef</i>	
Crack Detection in Structures without Remeshing Based on Arrival Time Information	759
<i>D. Rabinovich, D. Givoli, S. Vigdergauz</i>	
Seeker Gyro Calibration via Model-based Fusion of Visual and Inertial Data.....	769
<i>M. Goldshtain, Y. Oshman, T. Efrati</i>	
Generalized WAHBA Problems for Spinning Spacecraft Attitude and Rate Determination	789
<i>M. Psiaki</i>	
Asymptotic Behavior of the Covariance of Quaternion Estimators	811
<i>A. Carmi, Y. Oshman</i>	
Adaptive Optimal-REQUEST Algorithm for Attitude Determination	839
<i>D. Choukroun</i>	
Effects of Mach Number on Circulation Control Elliptic Airfoils	868
<i>C. Friedman, R. Arieli, Y. Levy</i>	
Airfoil Flow Control via Steady Blowing and Coanda Effect.....	885
<i>S. Tiomkin, C. Friedman, R. Arieli</i>	
High-Performance Wind Turbines using Active Flow Control	900
<i>O. Stalnov, A. Kribus, A. Seifert</i>	
Two State-of-the-Art Three-Dimensional Experimental Methods Ready for the Research of Turbulence	913
<i>A. Liberzon, A. Tsinober</i>	

Reynolds Number Scaling in Subcritical Channel Flow Transition.....	924
<i>J. Philip, A. Svizher, J. Cohen</i>	
Gas Flows Through Constricted Shallow Micro-Channels.....	928
<i>A. Gat, I. Frankel, D. Weihs</i>	
The Evolution of Finite-Amplitude Localized Vortices in Linear Shear Flows	943
<i>M. Karp, I. Shukhman, J. Philip, J. Cohen</i>	
Preliminarily Modeling of the Combustion of Gel Fuel Droplets	948
<i>A. Kunin, B. Natan, J. Greenberg</i>	
The Effect of Metal Particulates on the Rheological Properties of Gel Fluids	965
<i>V. Chernov, B. Natan</i>	
Experimental Evaluation of Gel Fuel Droplet Burning Rates	975
<i>D. Bar-or, B. Natan</i>	
Characterization of Gelled Jet-A1 Fuel with High Vapor-Pressure Species and Metal Additives	985
<i>A. Desyatkov, K. Madlener, H. Ciezki, B. Natan</i>	
The First 75 Years of Weapon Guidance - 1870-1945.....	998
<i>N. Shneydor</i>	
Bounds on the RMS Miss of Radar Guided Missiles.....	1038
<i>I. Rusnak</i>	

VOLUME 3

An Optimal Guidance Law for Imposing A Terminal Intercept Angle	1066
<i>V. Shaferman, T. Shima</i>	
Transmittance of Aerosols and Molecular Bands in Plumes: Theoretical Predictions vs. Measurement	1085
<i>A. Devir, A. Devir, A. Lessin, M. Shvabelman, H. Wirzberger</i>	
Measurement and Simulation of Two-Phase Reactive Plume of Solid-Fuel IBEM Motor	1097
<i>J. Kanelbaum, S. Yaniv, H. Wirzberger, A. Lessin</i>	
Investigation of Particles Plume Generated by Laser Ablation	1106
<i>G. Don-Yehiya, J. Stricker</i>	
Experimental Investigation of Several Kinds of Spike-type and Modal-type Stall Inception	1121
<i>Y. Levy, J. Pismenny</i>	
Enhancing the Starting Capability of Turbine Engines by Use of a Solid Oxidizer or Oxygen-Rich Capsule	1134
<i>A. Gross, S. Khosid, A. Peretz</i>	
Comparison Between Blade-Element Models of Propellers.....	1139
<i>O. Gur, A. Rosen</i>	
Rotor Performance Model for Flight Simulation in Ground Effect.....	1170
<i>V. Khromov, O. Rand</i>	
Rotorcraft Track and Balance Using a High Fidelity Simulation Model	1187
<i>C. Friedman, O. Rand</i>	

Analysis of Sway Braces Effect on Store Separation Using CFD Simulations	1212
<i>L. Hamelnick, M. Adar</i>	
A Computational Method for Fast & Easy External Store Separation Analysis at Subsonic Flow.....	1232
<i>T. Rokita</i>	
6DoF Analysis of the Dynamic Separation of Two Overlapping Bodies.....	1258
<i>I. Nov</i>	
Design Considerations of Satellite Protective Fairing Separation	1264
<i>U. Landau</i>	
Evolution of Forebody Vortices over Slender Bodies at High Angles of Attack.....	1280
<i>M. Bercovici, E. Arad, G. Iosilevskii</i>	
Analytical Investigation of Antenna Whip Vibration and Failure During Flight Test	1300
<i>M. Weidenfeld, R. Shenkar</i>	
Induced Negative Roll-Damping in a Slender Wing-Body Configuration	1319
<i>A. Davidovitch</i>	
Squint Limits for Space-Borne De-Chirp Spot SAR Imaging	1331
<i>U. Naftaly</i>	
The Venus IHET Payload - Mission and Reliability Considerations in the Design of a Technological Payload	1338
<i>J. Herscovitz, L. Teper, I. Tidhar, A. Warshavsky</i>	
A Parametric Investigation of a Propulsion System for Air Launch of Micro-Satellites from a Combat Aircraft	1346
<i>A. Socher, A. Gany</i>	
Spray Diffusion Flames - An Asymptotic Theory	1370
<i>S. Lerman, J. Greenberg</i>	
A New Similarity Solution for a Spray Diffusion Flame in a Shear Layer	1392
<i>J. Greenberg, D. Katoshevski</i>	
Large Stokes Number Analysis of Steady State Polydisperse Counterflow Spray Diffusion Flames	1411
<i>A. Dvorjetski, J. Greenberg</i>	
Structural Design of Ceramic Radome for Hypersonic Velocity.....	1429
<i>I. Schnitzer, S. Cohen, L. Kacir, D. Pinto</i>	
Failure Analysis for a Missile Ceramic Rader Dome	1439
<i>D. Rosenberg, Z. Lavee, D. Pinto, I. Schintzer</i>	
Design Manufacturing and Substantiation of an Airborne Composite Radome Mounted on an Aircraft Dome.....	1445
<i>G. Ghilai, I. Kressel, U. Ben-Simon, M. Elyahu, D. Peled, A. David, T. Nachshon, Y. Gary, M. Interator, A. Simon</i>	
A Transfer Matrix Model of Large Deformations of Curved Rods	1449
<i>A. Rosen, O. Gur</i>	
Design and Analysis of Coupling Suspension for Rotary Piezoelectric Actuator	1479
<i>S. Eliahou-Niv, A. Yifrach, D. Oster</i>	
Accelerated Ageing Program for a Rubber Product: Flexible Joint	1487
<i>A. Klein</i>	

"PAZLAT" - An Unmanned Aerial Refueling System	1499
<i>A. Ronen, G. Roie, E. Shani, H. Carmitt, K. Gershon, M. Slava, N. Vladislav, P. Mark, R. Jakob, W. Dotan, Z. Robert, K. Itsik</i>	
BBUG - AIAA DBF Contest.....	1515
<i>S. Buchnik, M. Ben-Zelan, S. Shacham, G. Lena, I. Shmilovitch, I. Bachar, H. Ronen, N. Bar, S. Zach</i>	
The Toolsat Project: Inexpensive Small Satellite For On-Orbit Autonomous Servicing	1544
<i>L. Appel, M. Chojnacki, G. Nir, N. Frenkel, T. Schwartz, E. Gladshtain, M. Yagudayev, D. Mishne, F. Ortenberg</i>	
Waterspout - Advanced Deployable Compact Rotorcraft in Support of Special Operation Forces	1566
<i>M. Gilad, L. Shani, A. Schneller, I. Teller, E. Sinai, R. Hachmon, A. Elimelech, O. Rand, C. Friedman, P. Branson, M. Mistry, A. Razzano, D. Leonard, E. Smith, R. Bill</i>	

Author Index