

# **17th International Forum on Aeroelasticity and Structural Dynamics (IFASD 2017)**

Como, Italy  
25 - 28 June 2017

Volume 1 of 4

ISBN: 978-1-5108-6100-8

**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© (2017) by International Forum on Aeroelasticity and Structural Dynamics (IFASD)  
All rights reserved.

Printed by Curran Associates, Inc. (2018)

For permission requests, please contact IFASD  
at the address below.

IFASD  
c/o Prof. Sergio Ricci  
Dipartimento di Scienze e Tecnologie Aerospaziali – Politecnico di Milano  
via La Mesa 34, 20156 Milano - Italy

Sergio.Ricci@polimi.it

**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

|  |     |
|--|-----|
| <b>COMPARISON OF HIGH-FIDELITY AERO-STRUCTURE GRADIENT COMPUTATION TECHNIQUES. APPLICATION ON THE CRM WING DESIGN</b> .....                                | 1   |
| <i>T. Achard, C. Blondeau, R. Ohayon</i>   |     |
| <b>EXPERIMENTAL AND NUMERICAL SIMULATIONS OF NACA 0018 AIRFOIL UNDERGOING STALL FLUTTER WITH STRUCTURAL NONLINEARITY</b> .....                             | 21  |
| <i>A. F. Razaami, M. K. H. M. Zorkipli, N. A. Razak</i>  |     |
| <b>VALIDATION AND EVALUATION OF A NONLINEAR AEROELASTIC FRAMEWORK USING FLIGHT TEST DATA</b> .....   | 37  |
| <i>F. Afonso, J. Vale, É. Oliveira, F. Lau, F. Moreira, J. Marra, A. Meinicke, M. Pedras, O. Mello, J. Richards, W. Brussow, S. Warwick, A. Suleman</i>    |     |
| <b>A METHOD FOR PREDICTING MULTIVARIATE RANDOM LOADS AND A DISCRETE APPROXIMATION OF THE MULTIDIMENSIONAL DESIGN LOAD ENVELOPE</b> .....                   | 47  |
| <i>C. Aquilini, D. Parisse</i>   |     |
| <b>AIRBUS DEFENCE &amp; SPACE AWACS PROTOTYPES: AWACS-DOME AEROELASTIC AND DYNAMIC LOADS CHALLENGES</b> .....  | 67  |
| <i>F. Arévalo, M. R. Guitián, P. M. López, J. L. P. Galán, H. Climent, J. Rodriguez</i>  |     |
| <b>COMPUTATIONAL FLUID DYNAMICS BASED AEROELASTIC SYSTEM IDENTIFICATION AND FLUTTER PREDICTION</b> .....   | 83  |
| <i>M. Argaman, D. E. Raveh</i>   |     |
| <b>AERODYNAMICS AND STRUCTURAL DESIGN STUDIES FOR FUEL CONSUMPTION REDUCTION ON SUBSONIC AIRCRAFT</b> .....  | 103 |
| <i>H. Arizono, D. Kwak, T. Nomura</i>  |     |
| <b>STRUCTURAL DESIGN OF WING TIP PART FROM AEROELASTICITY CONSIDERATION</b> .....  | 113 |
| <i>K. Balunov, V. Chedrik, F. Ishmuratov</i>   |     |
| <b>FLIGHT CONTROL DESIGN TO IMPROVE AIRCRAFT PERFORMANCE BY REDUCING THE FLUTTER AND DYNAMIC LOADS MARGINS</b> .....                                       | 119 |
| <i>L. Benassi</i>  |     |
| <b>NESTED LIMIT CYCLES IN TRANSONIC FLUTTER</b> .....  | 128 |
| <i>O. Bendiksen</i>  |     |
| <b>FAST PREDICTION OF FLUTTER AND FLUTTER SENSITIVITIES</b> .....  | 149 |
| <i>P. S. Beran, K. Wang, B. Stanford</i>   |     |
| <b>DYNAMIC GAIN SCHEDULING OF HIGHLY FLEXIBLE AIRCRAFT APPLYING ADAPTIVE CONTROL</b> .....   | 169 |
| <i>R. M. Bertolin, F. J. Silvestre, A. B. Guimarães Neto, P. J. Gonzalez, G. C. Barbosa, C. E. S. Cesnik</i>   |     |
| <b>INFLUENCE OF AERODYNAMIC NONLINEARITY ON FLUTTER OF CURVED PANELS AT TRANSONIC AND LOW SUPERSONIC MACH NUMBERS</b> .....                                | 186 |
| <i>M. Bhatia, P. Beran</i>   |     |
| <b>EXTENSION OF THE CONTINUOUS TIME UNSTEADY VORTEX LATTICE METHOD FOR ARBITRARY MOTION, CONTROL SURFACE DEFLECTION AND INDUCED DRAG CALCULATION</b> ..... | 206 |
| <i>S. Binder, A. Wildschek, R. De Breucker</i>   |     |
| <b>SURROGATE-BASED AERODYNAMICS FOR COMPOSITE WING BOX SIZING</b> .....  | 225 |
| <i>M. T. Bordogna, D. Bettebghor, C. Blondeau, R. De Breucker</i>  |     |
| <b>AEROELASTIC TAILORING FOR STATIC AND DYNAMIC LOADS WITH BLENDING CONSTRAINTS</b> .....  | 244 |
| <i>M. T. Bordogna, P. Lancelot, D. Bettebghor, R. De Breucker</i>  |     |
| <b>WIND-TUNNEL TESTING FOR VALIDATION OF A METHOD FOR NONLINEAR FLUID/STRUCTURE INTERACTION USING SURROGATE MODELS</b> .....                               | 264 |
| <i>E. Bosco, A. Lucchetti, S. Trapier, F. G. Di Vincenzo, N. Gourdain, J. Morlier</i>  |     |
| <b>DYNAMIC STALL ONSET VARIATION WITH REDUCED FREQUENCY FOR THREE STALL MECHANISMS</b> .....   | 281 |
| <i>J. Boutet, G. Dimitriadis, X. Amandolese</i>  |     |
| <b>PRACTICAL CONSIDERATIONS FOR THE DESIGN OF AN AEROELASTIC ENERGY HARVESTER</b> .....  | 296 |
| <i>C. Bruni, E. Cestino, G. Frulla, P. Marzocca, J. Gibert, N. D'Onghia</i>  |     |
| <b>FLIGHT LOADS PREDICTION OF HIGH ASPECT RATIO WING AIRCRAFT USING MULTIBODY DYNAMICS</b> .....   | 315 |
| <i>M. Castellani, J. Cooper, Y. Lemmens</i>  |     |
| <b>CROSS-MODAL DAMPING MODEL: AN EXPERIMENTAL EXTRACTION APPROACH AND AIRCRAFT DYNAMIC LOADS APPLICATION</b> .....   | 336 |
| <i>O. C. Alvarez, J. Coote</i>   |     |
| <b>SOME SPECIAL MODELLING TECHNIQUES FOR PREPARATION OF AEROELASTIC STICK MODELS</b> .....   | 350 |
| <i>J. Ceerdle</i>  |     |
| <b>MODAL FORMULATION FOR GEOMETRICALLY NONLINEAR STRUCTURAL DYNAMICS</b> .....   | 359 |
| <i>R. R. Medeiros, C. E. S. Cesnik, E. Coetzee</i>   |     |
| <b>EFFICIENT AEROELASTIC RESPONSE ANALYSIS INCLUDING GEOMETRIC NONLINEARITIES BASED ON STRUCTURAL ROM</b> .....  | 379 |
| <i>A. Chao, X. Changchuan, B. Ying, Y. Chao</i>  |     |

|   |     |
|---|-----|
| <b>FLUTTER BOUNDARY PREDICTION FOR A TWIN-ENGINE TRANSPORT FLUTTER MODEL USING A LINEARIZED UNSTEADY SOLVER</b> .....                           | 394 |
| <i>S. Yang, Z. Wang, Z. Zhang, P. C. Chen</i>   |     |
| <b>CONSIDERATION OF POD INTERPOLATION FOR AEROELASTIC DESIGN WITH LARGE GLOBAL STRUCTURAL VARIATION USE STRUCTURAL DYNAMIC REANALYSIS</b> ..... | 413 |
| <i>L. Dongfeng, G. Chen, A. Da Ronch, Q. Zhou, Z. Zhoua, Y. Li</i>  |     |
| <b>INVESTIGATION OF FLUTTER CHARACTERISTICS OF AIRCRAFT WITH CONTROL SYSTEM</b> .....   | 433 |
| <i>M. Zichenkov, A. Chizhov, S. Kuzmina, F. Ishmuratov, A. Zubakov</i>  |     |
| <b>CFD MODEL OF THE TRANSONIC DYNAMICS TUNNEL WITH APPLICATIONS</b> .....   | 451 |
| <i>P. Chwalowski, J. Heeg, W. A. Silva, C. Wieseman</i>   |     |
| <b>EXPERIMENTAL DITCHING LOADS ON AERONAUTICAL FLEXIBLE STRUCTURES</b> .....  | 470 |
| <i>H. Climent, G. Pastor, J. T. Viana</i>   |     |
| <b>MODAL PARAMETER ESTIMATE OF TIME-VARYING SYSTEM USING OPERATIONAL MODAL ANALYSIS BASED ON HILBERT TRANSFORM</b> .....                        | 489 |
| <i>E. Conti, F. Saltari, M. Eugeni, G. Coppotelli, V. Camerini</i>  |     |
| <b>UNCERTAINTY QUANTIFICATION IN GUST LOADS ANALYSIS OF A HIGHLY FLEXIBLE AIRCRAFT WING</b> .....   | 503 |
| <i>R. G. Cook, C. J. A. Wales, A. L. Gaitonde, D. P. Jones, J. E. Cooper</i>  |     |
| <b>EXPERIMENTAL VALIDATION OF TOW-STEERED COMPOSITE WINGS FOR AEROELASTIC DESIGN</b> .....  | 518 |
| <i>O. Stodieck, G. Francois, D. Heathcote, E. Zymeloudis, B. Chul Kim, A. Rhead, D. Cleaver, J. E. Cooper</i>                                   |     |
| <b>WIND TUNNEL TESTING OF FOLDING WING-TIP DEVICES FOR GUST LOADS ALLEVIATION</b> .....   | 534 |
| <i>R. C. M. Cheung, A. Castrichini, D. Rezgui, J. E. Cooper, T. Wilson</i>  |     |
| <b>INDUSTRIAL FREQUENCY-DOMAIN LINEARIZED NAVIER-STOKES CALCULATIONS FOR AEROELASTIC PROBLEMS IN THE TRANSONIC FLOW REGIME</b> .....            | 551 |
| <i>G. Broux, F. Chalot, L. Dumas, N. Forestier, Z. Johan, M. Mallet, A. Bissuel</i>   |     |
| <b>POLYNOMIAL NONLINEAR STATE-SPACE MODELLING OF VORTEX-INDUCED VIBRATIONS: BLACK-BOX VS GREY-BOX APPROACH</b> .....                            | 568 |
| <i>J. Decuyper, J. P. Noel, T. De Troyer, M. C. Runacres, J. Schoukens</i>  |     |
| <b>AEROELASTIC LIMIT CYCLE OSCILLATIONS ON A 3D WING</b> .....  | 585 |
| <i>S. Dequand, G. D. Mortchéléwicz, A. Sens</i>   |     |
| <b>IMPROVING AEROELASTIC MODEL ACCURACY AND AFFORDABILITY BY EXPLOITING WIND TUNNEL TEST RESULTS</b> .....                                      | 601 |
| <i>M. Di Gifico, V. Vaccaro</i>   |     |
| <b>NONLINEAR AEROELASTIC STEADY SIMULATION APPLIED TO HIGHLY FLEXIBLE BLADES FOR MAV</b> .....  | 620 |
| <i>F. G. Di Vincenzo, F. Mohdzawawi, J. Morlier, M. Linari</i>  |     |
| <b>NONLINEAR FLUTTER ANALYSIS OF A MISSILE WITH NONLINEARITY AND HYSTERESIS</b> .....   | 640 |
| <i>A. Drachinsky</i>  |     |

## VOLUME 2

|  |     |
|--|-----|
| <b>OVERVIEW OF SOME ONERA RECENT ADVANCES IN ROTATING MACHINES NUMERICAL AEROELASTICITY</b> .....  | 660 |
| <i>A. Dugeai, S. Verley, A. Placzek, Y. Mauffrey</i>   |     |
| <b>INCLUSION OF PROPELLER EFFECTS ON AEROELASTIC BEHAVIOR OF VERY FLEXIBLE AIRCRAFT</b> .....  | 678 |
| <i>P. C. Teixeira, C. E. S. Cesnik</i>   |     |
| <b>STUDY OF THE NONLINEARITY IN THE AEROELASTIC RESPONSE AT HIGH ANGLE OF ATTACK BY WIND TUNNEL EXPERIMENTS IN THE ACTIVE AEROELASTIC TEST BENCH</b> ..... | 696 |
| <i>J. Ertveldt, A. Lamberti, B. De Pauw, A. Rezayat, R. Pintelon, S. Vanlanduit</i>  |     |
| <b>TOWARDS A NON-LINEAR FULL AIRCRAFT MODEL FOR PASSENGER AIRCRAFT LOADS CALCULATIONS</b> .....  | 713 |
| <i>J. C. Farao, A. G. Malan, F. Gambioli</i>   |     |
| <b>CFD-BASED FLUTTER PREDICTION FOR HIGH REYNOLDS NUMBER FLOWS WITH FREE BOUNDARY LAYER TRANSITION</b> .....   | 726 |
| <i>M. Fehrs, J. Nitzsche, A. Hebler</i>  |     |
| <b>WIND TUNNEL EVALUATION OF A STATIC OUTPUT FEEDBACK CONTROLLER FOR GUST LOAD ALLEVIATION ON A REGIONAL AIRCRAFT</b> .....                                | 746 |
| <i>F. Fonte, S. Ricci, P. Mantegazza</i>   |     |
| <b>EFFICIENT REDUCED-ORDER MODELING FOR SKIN PANELS IN HYPERSONIC FLOW AND ITS APPLICATION TO GENERATING AEROTHERMOELASTIC SCALING LAWS</b> .....          | 760 |
| <i>D. Huang, T. Rokitay, P. P. Friedmann</i>   |     |
| <b>ROBUST AERODYNAMIC OPTIMIZATION FOR HELICOPTER BLADE MORPHING AIRFOILS</b> .....  | 790 |
| <i>F. Fusi, P. M. Congedo, G. Quaranta</i>   |     |
| <b>WIND TUNNEL FLUTTER TEST OF A U-TAIL CONFIGURATION - PART 1: MODEL DESIGN AND TESTING</b> .....   | 814 |
| <i>A. Geeraert, A. Lepage, P. Stephani, D. Feldmann, W. Haberli</i>  |     |
| <b>INVESTIGATION OF FREQUENCY LOCK-IN PHENOMENA ON A SUPERCRITICAL AEROFOIL IN THE PRESENCE OF TRANSONIC SHOCK OSCILLATIONS</b> .....                      | 834 |
| <i>N. F. Giannelis, G. A. Vio</i>  |     |

|  |      |
|--|------|
| <b>LIMIT CYCLE OSCILLATIONS OF CANTILEVER RECTANGULAR FLAT PLATES IN A WIND TUNNEL</b> .....   | 849  |
| <i>N. Giannelis, G. A. Vio, G. Dimitriadis</i>   |      |
| <b>X-HALE AUTOPILOT WITH STABILITY AUGMENTATION AND SHAPE CONTROL BASED ON LOOP SEPARATION</b> .....   | 861  |
| <i>P. J. Gonzalez, A. B. Guimaraes Neto, R. M. Bertolin, F. J. Silvestre, C. E. S. Cesnik, G. C. Barbosa</i>   |      |
| <b>TRANSONIC AEROELASTICITY USING THE 2.5D NON-LINEAR VORTEX-LATTICE METHOD</b> .....  | 880  |
| <i>A. Grozdanov, E. Laurendeau</i>   |      |
| <b>VALIDITY OF THE ASSUMPTION OF SMALL DEFORMATIONS IN AIRCRAFT WITH DIFFERENT LEVELS OF STRUCTURAL FLEXIBILITY</b> .....                                | 898  |
| <i>A. B. Guimaraes Neto, F. J. Silvestre, F. L. C. Ribeiro, F. L. S. Bussamra, R. G. A. Da Silva, C. E. S. Cesnik</i>                                    |      |
| <b>RESPONSE AND STABILITY OF THE REMOTELY-PILOTED, CONSTRAINED X-HALE AIRCRAFT IN WIND TUNNEL</b> .....  | 937  |
| <i>A. B. Guimaraes Neto, F. J. Silvestre, F. L. S. Bussamra, R. G. A. Da Silva, C. E. S. Cesnik</i>  |      |
| <b>RESEARCH ON FAST AEROELASTIC MODELING METHODS FOR THE TRANSONIC REGIME</b> .....  | 972  |
| <i>H. Gumer, G. Dimitriadis, V. E. Terrapon</i>  |      |
| <b>PARAMETRICALLY RICH NONLINEAR REDUCED-ORDER MODELING: AN APPLICATION IN VISCOUS INCOMPRESSIBLE FLOW</b> .....   | 991  |
| <i>T. Kim, E. Dowell</i>   |      |
| <b>FLIGHT LOADS ANALYSIS AND MEASUREMENTS OF EXTERNAL STORES ON AN ATMOSPHERIC RESEARCH AIRCRAFT</b> .....   | 1008 |
| <i>V. Handojo, T. Klimmek, W. Krüger</i>   |      |
| <b>EXPERIMENTAL ASSESSMENT OF THE FLUTTER STABILITY OF A LAMINAR AIRFOIL IN TRANSONIC FLOW</b> .....   | 1024 |
| <i>A. Hebler</i>   |      |
| <b>COMPARISON OF DIFFERENT APPROACHES FOR MODELING OF ATMOSPHERIC EFFECTS LIKE GUSTS AND WAKE-VORTICES IN THE CFD CODE TAU</b> .....                     | 1037 |
| <i>R. Heinrich, L. Reimer</i>  |      |
| <b>HIGHT FIDELITY TRIM CALCULATION UNDER CONSIDERATION OD AEROELASTIC EFFETCS OF A HIGH ASPECT RADIO SWEEP WING</b> .....                                | 1050 |
| <i>A. Hermanutz, M. Hornung</i>  |      |
| <b>AN IMPROVED SOFTWARE FOR FREQUENCY DOMAIN ANALYSIS OF ASSEMBLED AIRCRAFT STRUCTURES WITH LOCAL NONLINEARITIES</b> .....                               | 1066 |
| <i>S. Hernandez, E. Menga, C. López, A. Baldomir, M. Cid, D. Freire, S. Moledo, P. Naveira</i>   |      |
| <b>NUMERICAL VALIDATION OF GUST RESPONSE AND NUMERICAL ASSESSMENT OF GUST LOAD ALLEVIATION FOR 2D AEROELASTIC AIRFOIL IN TRANSONIC CONDITIONS</b> .....  | 1079 |
| <i>F. Huvelin, A. Le Page, C. Poussot-Vassal</i>   |      |
| <b>ASSESSMENT OF ADVANCED FLUTTER FLIGHT TEST TECHNIQUES AND FLUTTER BOUNDARY PREDICTION METHODS</b> .....   | 1098 |
| <i>M. Iovnovich, N. Tz'ilil, M. Presmanz, D. Avsaid, T. Braier, D. E. Raveh</i>  |      |
| <b>NUMERICAL SIMULATION OF TRANSONIC FLUTTER OF A T-TAIL</b> .....   | 1124 |
| <i>K. Isogai</i>   |      |
| <b>TOPOLOGY OPTIMIZATION AND 3-D PRINT ACCORDING TO AEROELASTIC BEHAVIOR OF HIGH ASPECT RATIO WING</b> .....   | 1139 |
| <i>J. Lv, L. Guo, Z. Liu, K. Yuan</i>  |      |
| <b>COMPARISON OF NONLINEAR CFD WITH TIME-LINEARIZED CFD AND CFD-CORRECTED DLM FOR GUST ENCOUNTER SIMULATIONS</b> .....                                   | 1145 |
| <i>C. Kaiser, D. Friedewald, J. Nitzsche</i>   |      |
| <b>NONLINEAR-STRUCTURAL-NONLINEAR-AERODYNAMIC MODEL FOR STATIC AEROELASTIC PROBLEMS</b> .....  | 1161 |
| <i>E. Kantor, D. E. Raveh</i>  |      |
| <b>EXPERIMENTAL AND ANALYTICAL INVESTIGATIONS OF AFIGHTER-LIKE WIND TUNNEL MODEL WITH EXTERNAL STORES</b> .....  | 1181 |
| <i>A. Karlsson, U. Ringertz</i>  |      |
| <b>PARAMETRIC FLUTTER MARGINS OF A TWIN TAIL CONFIGURATION IN WING-GENERATED BUFFET</b> .....  | 1199 |
| <i>M. Karpel, F. Roizner, R. Carrese, P. Marzocca</i>  |      |
| <b>AN INTEGRATED MODEL FOR LATERAL GUST LOADS ANALYSIS AND DUTCH ROLL FLIGHT DYNAMICS USING A 3D PANEL METHOD</b> .....                                  | 1213 |
| <i>T. M. Kier</i>  |      |
| <b>VALIDATION OF TOPOLOGY OPTIMIZED LIFTING SURFACES WITH AEROELASTIC CONSTRAINTS USING 3-D PRINTING</b> .....   | 1230 |
| <i>J. D. Deaton, R. M. Kolonay, R. Reuter, M. H. Kobayashi</i>   |      |
| <b>CLOSED-LOOP FLIGHT TESTS WITH AN UNMANNED EXPERIMENTAL MULTI-BODY AIRCRAFT</b> .....  | 1246 |
| <i>A. Köthe, A. Hamann, R. Luckner, A. Behrens, P. Nagel, D. Nowka</i>   |      |
| <b>EXPERIMENTAL DETERMINATION OF DYNAMIC CHARACTERISTICS OF AIRCRAFT LANDING GEAR AND METHODS OF IDENTIFICATION OF THEIR MODAL CHARACTERISTICS</b> ..... | 1263 |
| <i>A. V. Krapivko, V. N. Zadonskay, O. A. Orlova</i>   |      |
| <b>MODELING OF FORCED VIBRATIONS OF THE AIRPLANE WITH THE ENGINE IMBALANCE AT GROUND RESONANCE TESTS</b> .....   | 1283 |
| <i>R. Leonteva, M. Pronin, V. Smyslov</i>  |      |

|   |      |
|---|------|
| <b>A CFD BASED AEROELASTIC GUST MODEL FOR FULL AIRCRAFT SIMULATION</b> .....          | 1292 |
| <i>W. Man, A. B. Mowat, A. G. Malan, J. Farao</i>                                     |      |
| <b>STATIC FULLY COUPLED SIMULATION OF A TRANSPORT AIRCRAFT HIGH-LIFT SYSTEM</b> ..... | 1299 |
| <i>A. Lurgo, R. H. Jung</i>   |      |
| <b>AEROELASTIC ANALYSIS OF DOUBLE-SWEPT ROTOR BLADE IN HOVERING CONDITION</b> .....   | 1318 |
| <i>M. R. Kumar, L. Rao</i>  |      |

### VOLUME 3

|  |      |
|--|------|
| <b>DEVELOPMENT OF A BUFFET LOAD MITIGATION SYSTEM BASED ON MULTI-SURFACE CONTROL</b> .....   | 1332 |
| <i>S. Malik, L. Riccobene, S. Ricci, D. Monti</i>  |      |
| <b>WIND TUNNEL FLUTTER TESTS OF A U-TAIL CONFIGURATION PART 2: EXPERIMENTAL AND NUMERICAL RESULTS</b> .....                              | 1352 |
| <i>H. Mamelie, G. Broux, E. Garrigues</i>  |      |
| <b>AN INVESTIGATION IN HI-FI FINITE ELEMENT MODELLING AIMED TO IMPROVE LCO PREDICTION</b> .....  | 1369 |
| <i>A. Manes, A. Gilioli, M. Giglio</i>   |      |
| <b>ENABLING PRACTICAL WING DESIGN VIA HIGH-FIDELITY MULTIDISCIPLINARY OPTIMIZATION</b> .....   | 1377 |
| <i>J. R. R. A. Martins, T. Brooks</i>  |      |
| <b>OPTIMIZATION &amp; TESTING OF AEROELASTICALLY-TAILORED FORWARD SWEPT WINGS</b> .....  | 1402 |
| <i>J. K. S. Dillinger, Y. M. Meddaikar, Y. Govers</i>  |      |
| <b>A NEW DASSAULT INDUSTRIAL APPROACH FOR AERO-STRUCTURAL OPTIMIZATION OF COMPOSITE STRUCTURES WITH STACKING TABLE CONSTRAINTS</b> ..... | 1419 |
| <i>S. Meldrum, G. Broux, E. Garrigues, L. Colo</i>   |      |
| <b>UNCERTAINTY QUANTIFICATION IN THE DYNAMIC RESPONSE OF ASSEMBLED STRUCTURES</b> .....  | 1432 |
| <i>E. Menga, C. Lopez, S. Hernandez, A. Baldomir, I. Romero, M. Sanchez</i>  |      |
| <b>DEMONSTRATION OF INNOVATIVE VIBRATION CONTROL ON A FALCON BUSINESS JET</b> .....  | 1452 |
| <i>C. Meyer, G. Broux, J. Prodigue, O. Cantinaud, C. Poussot-Vassal</i>  |      |
| <b>DELAYED DES IN SU2: TEST CASE 3 FROM THE SECOND AIAA AEROELASTIC PREDICTION WORKSHOP</b> .....  | 1465 |
| <i>E. S. Molina, C. Spode, M. Righi, R. Silva, T. D. Economon, J. J. Alonso</i>  |      |
| <b>FLIGHT FLUTTER TESTING USING HIGHER ORDER DYNAMIC MODE DECOMPOSITION</b> .....  | 1477 |
| <i>R. Moreno-Ramos, S. Le Clainche, J. M. Vega, P. F. Taylor</i>   |      |
| <b>SELF ADAPTIVE POD BASED ROM AEROELASTIC SIMULATIONS</b> .....   | 1487 |
| <i>R. Moreno-Ramos, F. Varas, J. M. Vega</i>   |      |
| <b>NUMERICAL INVESTIGATION OF VIRTUAL CONTROL SURFACES FOR AEROELASTIC CONTROL ON COMPRESSOR BLADES</b> .....                            | 1505 |
| <i>V. Motta, L. Malzacher, D. Peitsch</i>  |      |
| <b>STRUCTURAL DYNAMIC INFLUENCE OF AN UHBR ENGINE ON A COANDA-WING</b> .....   | 1525 |
| <i>Ts. Muller, H. Hennings</i>   |      |
| <b>TOPOLOGY OPTIMISATION OF REPRESENTATIVE AIRCRAFT WING GEOMETRIES WITH AN EXPERIMENTAL VALIDATION</b> .....                            | 1539 |
| <i>D. Munk, G. Vio, G. Francois, J. E. Cooper</i>  |      |
| <b>THE LEADING EDGE VORTEX IN FLEXIBLE WING PROPULSION</b> .....   | 1553 |
| <i>R. C. Mysaa, K. Venkatramana</i>  |      |
| <b>A STATIC AEROTHERMOELASTIC RESPONSE ANALYSIS METHOD WITH CONSIDERING STIFFNESS UNCERTAINTY</b> .....                                  | 1566 |
| <i>N. Yi, Z. Wan, C. Yang, S. Zhu</i>  |      |
| <b>EFFECT OF ANGLE OF ATTACK, GAS COMPOSITION AND REYNOLDS NUMBER ON FLUTTER BOUNDARY OF BENCHMARK SUPER-CRITICAL WING</b> .....         | 1574 |
| <i>J. Navratil, A. Jiraseky, A. Lofthousez, P. Hamlington</i>  |      |
| <b>UNCERTAINTY QUANTIFICATION IN THE VICINITY OF MODE SWITCHES IN THE FLUTTER RESPONSE OF A COMPOSITE CANTILEVERED WING</b> .....        | 1584 |
| <i>C. Nitschke, A. Vincenti, J.-C. Chassaing</i>   |      |
| <b>NUMERICAL SIMULATION AND EXPERIMENTAL FLUTTER RESEARCH OF AN AIRCRAFT WITH ASYMMETRIC CONTROL SURFACES</b> .....                      | 1604 |
| <i>O. Orlova, M. Pronin, V. Smyslov</i>  |      |
| <b>MODEL REDUCTION FOR GUST LOAD ANALYSIS OF FREE-FLYING AIRCRAFT</b> .....  | 1616 |
| <i>G. Pagliuca, P. Bekemeyer, R. Thormann, S. Timme</i>  |      |
| <b>COMPUTING DERIVATIVES IN NONLINEAR AEROELASTICITY USING ALGORITHM DIFFERENTIATION</b> .....   | 1634 |
| <i>R. Sanchez, R. Palacios</i>   |      |
| <b>STATE-SPACE REALIZATIONS AND MODEL REDUCTION OF POTENTIAL-FLOW UNSTEADY AERODYNAMICS WITH ARBITRARY KINEMATICS</b> .....              | 1642 |
| <i>S. Maraniello, R. Palacios, R. Simpson</i>  |      |
| <b>FROM MODEL TO MANUFACTURE: ADDITIVE AEROELASTIC MORPHING TESTBEDS</b> .....   | 1662 |
| <i>A. M. Pankonien, G. W. Reich, J. O. Hardin, N. Bhagat, J. D. Berrigan</i>   |      |

|  |      |
|--|------|
| <b>APPLICATION OF NONLINEAR MODEL ORDER REDUCTION TECHNIQUE TO A FLEXIBLE AIRCRAFT FOR REAL-TIME SIMULATIONS</b> .....               | 1677 |
| <i>J. A. Paulino, T. Monteiro, F. J. Silvestre, A. B. Guimaraes Neto, R. G. Silva, A. Da Ronch</i>                                   |      |
| <b>HARD LANDING AND REBOUND LANDING LOADS – IFASD 2017</b> .....   | 1692 |
| <i>A. Pérez De La Serna, S. Parra, H. Climent, E. Vinas</i>  |      |
| <b>CAMBER-MORPHING AIRFOILS TO REDUCE GUST SUSCEPTIBILITY</b> .....  | 1706 |
| <i>G. Quaranta, G. Tuzzi</i>   |      |
| <b>A NONLINEAR FREQUENCY DOMAIN AERODYNAMIC MODEL FOR CONTINUOUS TURBULENCE ENCOUNTER BASED ON FUNCTIONAL SERIES EXPANSION</b> ..... | 1714 |
| <i>D. Quero, W. Kruger</i>   |      |
| <b>PRELIMINARY AEROELASTIC DESIGN FRAMEWORK FOR COMPOSITE WINGS SUBJECTED TO GUST LOADS</b> .....                                    | 1736 |
| <i>D. Rajpal, R. De Breucker</i>   |      |
| <b>EXPERIMENTAL AND NUMERICAL INVESTIGATION OF POST-FLUTTER LIMIT CYCLE OSCILLATIONS ON A CANTILEVERED FLAT PLATE</b> .....          | 1755 |
| <i>K. Ramesh, T. Priolli Monteiro, F. J. Silvestre, A. B. Guimaraes Neto, R. Gil, A. Da Silva</i>                                    |      |
| <b>NUMERICAL INVESTIGATION OF SELF-SUSTAINED LIMIT-CYCLE OSCILLATIONS IN A FLAPPING-FOIL ENERGY HARVESTER</b> .....                  | 1774 |
| <i>E. Wang, K. Ramesh, I. M. Viola, S. Killen</i>  |      |
| <b>FLUTTER ANALYSIS FOR THE SECOND AEROELASTIC PREDICTION WORKSHOP</b> .....   | 1791 |
| <i>D. E. Raveh</i>   |      |
| <b>INFLUENCE OF REDUCED FREQUENCY ON CHOKE FLUTTER INSTABILITY IN TRANSONIC UHBR FAN</b> .....                                       | 1812 |
| <i>Q. Rendu, S. Aubert, P. Ferrand</i>   |      |
| <b>INCREASED-ORDER AEROSERVOELASTIC MODELING IN PRACTICE</b> .....   | 1827 |
| <i>M. Reyes, H. Climent, M. Karpel, F. Arevalo, C. Maderuelo</i>   |      |
| <b>SEMI-ANALYTICAL UNSTEADY AERODYNAMIC MODELING FOR A FLEXIBLE THIN AIRFOIL IN ARBITRARY MOTION</b> .....                           | 1844 |
| <i>C. Riso, G. Riccardi, F. Mastroddi</i>  |      |
| <b>ON THE ADOPTION OF HYBRID RANS-LES TURBULENCE MODELLING TECHNIQUE FOR AEROELASTIC PROBLEMS – IFASD 2017</b> .....                 | 1864 |
| <i>M. Righi</i>  |      |
| <b>DESIGN AND TESTING OF A FULL SPAN AEROELASTIC WIND TUNNEL MODEL</b> .....   | 1880 |
| <i>U. Ringertz, D. Eller, D. F. Keller, W. A. Silva</i>  |      |
| <b>A FEM-BASED APPROACH FOR NONLINEAR AEROELASTIC TRIM OF HIGHLY FLEXIBLE AIRCRAFT</b> .....   | 1900 |
| <i>C. Riso, F. G. Di Vincenzo, M. Ritter, C. E. S. Cesnik, F. Mastroddi</i>  |      |
| <b>FREE-FLIGHT NONLINEAR AEROELASTIC SIMULATIONS OF THE X-HALE UAV BY AN EXTENDED MODAL APPROACH</b> .....                           | 1918 |
| <i>M. Ritter, J. Jones, C. E. S. Cesnik</i>  |      |
| <b>AEROSERVOELASTIC STABILITY ANALYSIS USING RESPONSEBASED PARAMETRIC FLUTTER MARGINS</b> .....                                      | 1937 |
| <i>F. Roizner, M. Karpel</i>   |      |
| <b>AEROELASTIC ANALYSIS OF A FLUTTER DEMONSTRATOR WITH A VERY FLEXIBLE HIGH-ASPECT-RATIO SWEEP WING</b> .....                        | 1950 |
| <i>V. Rozov, C. Breitsamter, A. Hermanutz, M. Hornung</i>  |      |
| <b>LIMIT CYCLE OSCILLATION OF A SUPERSONIC TRANSPORT MODEL IN A TRANSONIC WIND TUNNEL TEST</b> .....                                 | 1963 |
| <i>K. Saitoh, N. Yoshimoto, H. Kheirandish</i>   |      |
| <b>ON THE CONTROL OF AEROELASTIC/FLIGHT DYNAMIC INTEGRATED STABILITY OF MANEUVERING AIRCRAFT</b> .....                               | 1971 |
| <i>F. Saltari, F. Mastroddi, C. Riso, G. De Matteis, S. Colaianni</i>  |      |
| <b>EFFECT OF CIRCUMFERENTIAL SURFACE PRESSURE INTEGRATION ON LAUNCH VEHICLE BUFFET FORCING FUNCTIONS</b> .....                       | 1987 |
| <i>M. K. Sekula, D. J. Piatak, R. D. Rausch</i>  |      |

#### VOLUME 4

|   |      |
|---|------|
| <b>INDIVIDUAL BLADE REPETITIVE CONTROL FOR HORIZONTAL-AXIS WIND TURBINES</b> .....  | 2006 |
| <i>R. Fratini, J. Serafini, M. Gennaretti, S. Panzneri, R. Santini</i>  |      |
| <b>APPLICATION OF LOW-ORDERWAKE INFLOW MODELS TO ROTORCRAFT AEROMECHANICS</b> .....   | 2024 |
| <i>J. Serafini, F. Cardito, G. Bernardini, M. Gennaretti</i>  |      |
| <b>COMPUTATIONAL AND EXPERIMENTAL RESULTS FOR THE KTH-NASA WIND-TUNNEL MODEL USED FOR ACQUISITION OF TRANSONIC NONLINEAR AEROELASTIC DATA</b> ..... | 2039 |
| <i>W. A. Silva, P. Chwalowski, C. D. Wieseman, D. Eller, U. Ringertz, D. Keller</i>   |      |
| <b>AEROM: NASA’S UNSTEADY AERODYNAMIC AND AEROELASTIC REDUCED-ORDER MODELING SOFTWARE</b> .....   | 2058 |
| <i>W. A. Silva</i>  |      |

|  |      |
|--|------|
| <b>RECONSTRUCTION OF GUST VELOCITY PROFILES VIA POTENTIAL FLOW, CFD AND ROM TECHNIQUES</b> .....                                 | 2078 |
| <i>S. Simeone, T. Rendall, S. P. I. Williams, J. E. Cooper, C. Wales, A. Gaitonde</i>  |      |
| <b>FLIGHT TESTING USING FAST ONLINE AEROELASTIC IDENTIFICATION TECHNIQUES WITH DLR RESEARCH AIRCRAFT HALO</b> .....              | 2096 |
| <i>J. Sinske, Y. Govers, G. Jelicic, R. Buchbach, J. Schwochow, M. Böswald, W. R. Krüger, V. Handoyo</i>                         |      |
| <b>EXPERIMENTAL INVESTIGATION OF FLUTTER BOUNDARY WITH CONTROLLED VIBRATION LEVELS</b> .....                                     | 2115 |
| <i>J. Sodja, R. De Breuker, F. Roizner, M. Karpel</i>  |      |
| <b>INVESTIGATION OF THE UNSTEADY FLOW OVER A WING UNDER GUST EXCITATION</b> .....  | 2132 |
| <i>J. Sodja, P. Lancelot, R. De Breuker</i>  |      |
| <b>HIGH-FIDELITY CFD-CSM INTERACTION IN THE INDUSTRIAL CONTEXT</b> .....   | 2144 |
| <i>B. Stickan, H. Bleecke, S. Helm, A. Rempke</i>  |      |
| <b>LINEARIZED UNSTEADY CFD FOR GUST LOADS WITH TAU – IFASD 2017</b> .....  | 2160 |
| <i>W. Weigold, B. Stickan, I. Travieso-Alvarez, C. Kaiser, P. Teufel</i>   |      |
| <b>OPTIMUM DISTRIBUTED WING SHAPING AND CONTROL LOADS FOR HIGHLY FLEXIBLE MISSION-ADAPTIVE AIRCRAFT</b> .....                    | 2175 |
| <i>J. R. Hammerton, W. Su, G. Zhu, S. Swei</i>   |      |
| <b>PASSIVE GUST LOADS ALLEVIATION IN A TRUSS-BRACED WING USING INTEGRATED DAMPERS</b> .....                                      | 2193 |
| <i>C. P. Szczygłowski, S. A. Neild, J. Z. Jiang, B. Titurus, J. E. Cooper, E. Coetzee</i>  |      |
| <b>STUDY ON ADAPTIVE WING STRUCTURE FOR COMPROMISING STRUCTURAL STRENGTH AND AERODYNAMIC PERFORMANCE</b> .....                   | 2206 |
| <i>M. Tamayama, K. Fujii, T. Yokozeki, H. Arizono</i>  |      |
| <b>QUANTITATIVE AEROELASTIC STABILITY EVALUATION OF CONTROL SURFACES WITH STRUCTURAL NONLINEARITIES</b> .....                    | 2216 |
| <i>A. Tamer, P. Masarati</i>   |      |
| <b>RELIABLE &amp; ROBUST OPTIMIZATION OF A LANDING GEAR SYSTEM</b> .....   | 2233 |
| <i>I. Tartaruga, J. E. Cooper, M. Lowenberg, Y. Lemmens</i>  |      |
| <b>INFLUENCE OF GUST MODELLING ON FREE-FLIGHT AEROFOILS</b> .....  | 2254 |
| <i>R. Thormann, G. Pagliuca, S. Timme</i>  |      |
| <b>RISK ANALYSIS FOR FLUTTER OF LAMINAR WINGS</b> .....  | 2272 |
| <i>L. Tichy, H. Mai, M. Fehrs, J. Nitzsche, A. Hebler</i>  |      |
| <b>SIMULATION-FREE HYPER-REDUCED MODELS FOR GEOMETRICALLY NONLINEAR STRUCTURAL DYNAMICS</b> .....                                | 2289 |
| <i>S. Jain, P. Tiso</i>  |      |
| <b>DESIGN OF AEROELASTIC WINGTIP DEVICES FOR WING LOAD ALLEVIATION</b> .....   | 2302 |
| <i>F. Toffol, F. Fonte, S. Ricci</i>   |      |
| <b>AN OPTIMIZED DOUBLET-LATTICE METHOD CORRECTION APPROACH FOR A LARGE CIVIL AIRCRAFT</b> .....                                  | 2318 |
| <i>C. Valente, C. Wales, D. Jones, A. Gaitonde, J. E. Cooper, Y. Lemmens</i>   |      |
| <b>FREEPLAY-INDUCED LIMIT CYCLE OSCILLATION MITIGATION USING LINEAR AND NONLINEAR TUNED VIBRATION ABSORBERS</b> .....            | 2333 |
| <i>E. Verstraelen, G. Kerschen, G. Dimitriadis</i>   |      |
| <b>EFFICIENT AND ACCURATE AEROELASTIC ANALYSES BASED IN SMALL-DISTURBANCE CFD IN EARLY AIRCRAFT DEVELOPMENT</b> .....            | 2351 |
| <i>C. Vidy, L. Katzenmeier, M. Winter, C. Breitsamter</i>  |      |
| <b>DYNAMIC MANEUVER LOADS CALCULATION FOR A SAILPLANE AND COMPARISON WITH FLIGHT TEST</b> .....                                  | 2367 |
| <i>A. Voss, G. P. Chiozzotto, P. Ohme</i>  |      |
| <b>THE AEROELASTIC BEHAVIOUR OF A FORWARD-SWEPT WING CONFIGURATION WITH FOCUS ON ENGINE GYROSCOPICS AND T-TAIL FLUTTER</b> ..... | 2386 |
| <i>S. Waitz</i>  |      |
| <b>COMPARISON OF AERODYNAMIC MODELS FOR 1-COSINE GUST LOADS PREDICTION</b> .....   | 2406 |
| <i>C. Wales, R. G. Cook, D. P. Jones, A. L. Gaitonde</i>   |      |
| <b>AN INTEGRATED OPTIMIZATION AND SURROGATE ANALYSIS OF LARGE AIRCRAFT IN CONCEPTUAL DESIGN</b> .....                            | 2419 |
| <i>X. Wang, Z. Wan, C. Yang</i>  |      |
| <b>MULTIDISCIPLINARY DESIGN OPTIMIZATION OF WING STRUCTURE FOR STRUT-BRACED WING AIRCRAFT CONSIDERING AEROELASTICITY</b> .....   | 2432 |
| <i>Z. Wang, Z. Wan, C. Yang, S. Zhu</i>  |      |
| <b>ADJOINT-BASED MESH ADAPTATION FOR DIRECT FLUTTER PREDICTION</b> .....   | 2445 |
| <i>K. G. Wang, P. S. Beran, S. Cao</i>   |      |
| <b>AEROELASTIC BEHAVIOUR OF HINGED WING TIPS</b> .....   | 2457 |
| <i>T. Wilson, A. Castrichini, J. E. Cooper, R. Ajaj, M. Herring, A. Azabal</i>   |      |
| <b>APPLICATION OF UNSTEADY AERODYNAMIC REDUCED-ORDER MODELING TECHNIQUES TO A COMPLEX CONFIGURATION</b> .....                    | 2475 |
| <i>M. Winter, C. Breitsamter</i>   |      |
| <b>NONLINEAR AERODYNAMIC IDENTIFICATION AND STALL FLUTTER ANALYSIS</b> .....   | 2494 |
| <i>Z. P. Xiang, Y. T. Dai</i>  |      |



|   |             |
|---|-------------|
| <b>NONLINEAR STATIC AEROELASTIC ANALYSIS OF HIGH ASPECT RATIO WING BASED ON CFD/CSD<br/>COUPLING SOLUTION .....</b> | <b>2505</b> |
| <i>L. Yang, X. Changchuan, Y. Chao, Z. Bing, A. Da Ronch</i>  |             |
| <b>DEFORMED WING SHAPE PREDICTION USING FIBER OPTIC STRAIN DATA – IFASD 2017 .....</b>                              | <b>2518</b> |
| <i>M. Yang, C. Xie, Z. Wan</i>  |             |
| <b>THE NONLINEAR FLUTTER WIND TUNNEL TEST OF A FOLDING FIN WITH FREEPLAY<br/>NONLINEARITIES .....</b>               | <b>2530</b> |
| <i>Y. Ning, W. Nan, Z. Xin, L. Wei</i>  |             |
| <b>RIGID&amp;ELASTIC COUPLING STABILITY ANALYSIS OF HYPERSONIC VEHICLES .....</b>                                   | <b>2544</b> |
| <i>Y. Yihan, X. Changchuan, H. Jingwu, J. Chongwen</i>  |             |
| <b>BODY FREEDOM FLUTTER OF A FLEXIBLE BLENDED WING BODY LIKE PLATE - AN<br/>EXPERIMENTAL STUDY .....</b>            | <b>2558</b> |
| <i>Y. Gu, Z. Yang, P. Marzocca, S. He</i>   |             |
| <b>AERO-THERMO-ELASTIC STABILITY ANALYSIS OF MULTI-LAYERED VISCO-ELASTIC PANELS .....</b>                           | <b>2574</b> |
| <i>E. Zappino, M. Filippi, E. Carrera</i>   |             |
| <b>FREE-VIBRATION ANALYSIS OF TAPEREDWING STRUCTURES USING REFINED ONE-DIMENSIONAL<br/>MODELS .....</b>             | <b>2586</b> |
| <i>A. Viglietti, E. Zappino, E. Carrera</i>   |             |
| <b>AEROSERVOELASTIC STABILITY ANALYSIS OF AN AIR-BREATHING HYPERSONIC VEHICLE .....</b>                             | <b>2599</b> |
| <i>H. Zhao, C. Yang, Z. Wu</i>  |             |
| <b>STABILITY ANALYSIS FOR A VERY FLEXIBLE FLYING .....</b>  | <b>2615</b> |
| <i>L. Yi, X. Changchuan, X. Yuntao, Z. Danjie</i>   |             |
| <b>A VARIATIONAL APPROACH FOR THE DYNAMICS OF UNSTEADY POINT VORTICES .....</b>                                     | <b>2626</b> |
| <i>A. A. Hussein, H. E. Taha, S. Ragab, M. R. Hajj</i>  |             |
| <b>FUEL LOADS IN LARGE CIVIL AIRPLANES .....</b>  | <b>2641</b> |
| <i>F. Gambioli, A. Malan</i>  |             |
| <b>RECENT DEVELOPMENTS IN OPERATIONAL MODAL ANALYSIS FOR GROUND AND FLIGHT<br/>VIBRATION TESTING .....</b>          | <b>2661</b> |
| <i>M. Böswald, J. Schwochow, G. Jelicic, Y. Govers</i>  |             |
| <b>Author Index</b>   |             |