

International Forum on Aeroelasticity and Structural Dynamics (IFASD 2015)

Saint Petersburg, Russia
28 June - 2 July 2015

Volume 1 of 3

ISBN: 978-1-5108-2182-8

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© (2015) by Central Aerohydrodynamic Institute
All rights reserved.

Printed by Curran Associates, Inc. (2016)

For permission requests, please contact Central Aerohydrodynamic Institute
at the address below.

Central Aerohydrodynamic Institute
1 Zhukovsky Street, TsAGI
Zhukovsky, Moscow Region, 140180
Russian Federation

Phone: +7 (495) 556-40-38

Fax: +7 (495) 777-63-32

ved@tsagi.ru

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

KEYNOTE LECTURE

RECENT PROGRESS IN PREDICTION OF BUFFET AND AEROACOUSTIC ENVIRONMENTS AT NASA	1
<i>D.M. Schuster</i>	

SESSION 1: COMPUTATIONAL AEROELASTICITY 1

COMBINED UNSTEADY AERODYNAMICS AND STRUCTURAL RESPONSE ON AUXILIARY POWER UNIT FLAP DOOR: STRENGTH AND FATIGUE JUSTIFICATION METHOD	18
<i>A. Palomares, R. Abarca, M. Barth</i>	
VERIFICATION OF THE USE OF SMALL-DISTURBANCE CFD AERODYNAMICS IN FLUTTER AND GUST ANALYSES FOR SIMPLE TO HIGHLY COMPLEX CONFIGURATIONS	30
<i>C. Vidy, L. Katzenmeier, M. Winter, C. Breitsamter</i>	
LINEARIZED FUN3D FOR RAPID AEROELASTIC DESIGN AND ANALYSIS	55
<i>S. Yang, P.C. Chen, Z. Wang</i>	
ACCELERATED CONVERGENCE OF HIGH-FIDELITY AEROELASTICITY USING LOW-FIDELITY AERODYNAMICS	72
<i>K. Jovanov, R. DeBreucker</i>	
AEROELASTIC SIMULATIONS OF FLEXIBLE AIRCRAFT WITH THE COMMERCIAL STRUCTURAL SOLVER ABAQUS	84
<i>M.C. Ruggeri, R.G.A. daSilva, C.E. deSouza</i>	
REYNOLDS-AVERAGED NAVIER-STOKES STUDY OF THE TRANSONIC LIMIT CYCLE OSCILLATION PHENOMENON ON THE F-16 FIGHTER AIRCRAFT	100
<i>M. Iovnovich, D.E. Raveh, D. Michaels, M. Adar</i>	
FLIGHT MECHANICAL MODELING AND ANALYSIS OF MULTI-BODY AIRCRAFT	128
<i>A. Kothe, R. Luckner</i>	
ISOGEOMETRIC FRAMEWORK FOR AEROELASTIC WIND TURBINE ROTOR ANALYSIS	153
<i>E. Ferede, M.M. Abdalla, J.K.S. Dillinger</i>	

SESSION 2: AERODYNAMICS/CFD 1

UNSTEADY AND POST-STALL AERODYNAMIC MODELING FOR AIRCRAFT DYNAMICS SIMULATION	172
<i>R.C. Paul, J. Murua, A. Gopalathnam</i>	
PASSIVE CONTROL OF TRANSONIC BUFFET ONSET ON A HALF WING-BODY CONFIGURATION	192
<i>S. Timme, F. Sartor</i>	
NONLINEAR AEROELASTIC MODELING VIA CONFORMAL MAPPINGS FOR A TYPICAL SECTION IN ARBITRARY MOTION	206
<i>C. Riso, G. Riccardi, F. Mastroddi</i>	
FREQUENCY-DOMAIN APPROACH FOR TRANSONIC UNSTEADY AERODYNAMICS MODELLING	225
<i>A. Poncet-Montanges, D. Jones, A.L. Gaitonde, J.E. Cooper, Y. Lemmens</i>	
ANALYSIS AND COMPUTATIONAL STUDY OF THE AERODYNAMICS AND AEROELASTICITY OF GENERIC FLAPPING WINGS	241
<i>H. Djojodihardjo, A.S.S. Ramli</i>	

SESSION 3: EXPERIMENTAL METHODS

THEORETICAL AND EXPERIMENTAL INVESTIGATION OF A STRUCTURALLY AND AERODYNAMICALLY NONLINEAR PITCH AND FLAP WING	259
<i>E. Verstraelen, J. Boutet, C. Grappasonni, G. Kerschen, G. Dimitriadis</i>	
AN EXPERIMENTAL DEMONSTRATION OF ACTIVE TRANSONIC BUFFET CONTROL USING A CLOSED-LOOP METHODOLOGY	278
<i>A. Lepage, J. Dandois, A. Geeraert, P. Molton, F. Ternoy, J.B. Dor, E. Coustols</i>	
SENSOR CALIBRATION FOR CALCULATION OF LOADS ON A FLEXIBLE AIRCRAFT	297
<i>M.V.P. Viana</i>	
EXPERIMENTAL IDENTIFICATION OF THE FLEXIBILITY INFLUENCE MATRIX OF THE AIRCRAFT ENGINE MOUNTED ON PYLON UNDER THE WING	321
<i>A. Grigoriev, V. Malyutin, A. Chizhov, A. Gubernatenko</i>	
ON THE DATA ACQUISITION FOR AEROELASTIC ANALYSIS USING PZT (LEAD ZIRCONATE TITANATE) EXCITATION AND TEST PARAMETERS DEFINITION	328
<i>E.L. Oliveira, R.G.A. daSilva, N.M.M. Maia, A.G. Marto, F.J. Afonso, A. Suleman</i>	
DESIGN AND TESTING OF A LOW SUBSONIC WIND TUNNEL GUST GENERATOR	341
<i>P.M.G.J. Lancelot, J. Sodja, N.P.M. Werter, R. DeBreuker</i>	

SESSION 4: AEROSERVOELASTICITY

MULTIOBJECTIVE OPTIMIZATION FOR SERVOELASTIC RESPONSE PREDICTIONS OF A FLY-BY-WIRE AIRCRAFT	359
<i>P. Srinivasan, A. Joshi, E. Hemalatha</i>	
CO-DESIGN OF VERY FLEXIBLE ACTUATED STRUCTURES	371
<i>S. Maraniello, R. Palacios</i>	
NONLINEAR ACTUATOR MODELING FOR AEROSERVOELASTIC DYNAMIC LOADS SIMULATIONS	396
<i>R. Veiberman, M. Weiss, M. Karpel</i>	
REDUCED-ORDER MODELLING AND FEEDBACK CONTROL OF INTEGRALLY ACTUATED MEMBRANE WINGS	410
<i>S. Buoso, R. Palacios</i>	
DYNAMIC STABILITY OF A HOSE-DROGUE-WING SYSTEM FOR AERIAL REFUELING	423
<i>P. Garcia-Fogeda, F. Arevalo</i>	
CONTROL OF THE GNBA AIRCRAFT BASED ON A UNIFIED DYNAMICS FORMULATION WITH INCLUSION OF AIRFRAME FLEXIBILITY	436
<i>F.J. Silvestre, A.B.G. Neto, R.M. Bertolin, P. Paglione</i>	

SESSION 5: LOADS

FLIGHT LOADS AND CUMULATIVE FATIGUE DAMAGES MONITORING FOR EACH AIRCRAFT DURING SERVICE LIFE	452
<i>V.I. Kleptsov, V.I. Tsimbalyuk, T.I. Orlova</i>	
INFLUENCE OF STRUCTURAL DAMPING ON AIRPLANE DYNAMIC LOADS AT FLIGHT IN TURBULENCE AND AT RUN	464
<i>O.A. Kuznetsov</i>	
GUST RESPONSE ANALYSIS OF HIGH ALTITUDE, LONG ENDURANCE AIRCRAFT	474
<i>C. Zhanjun, F. Zhichao, L. Jinan, L. Ziqiang</i>	
APPLICATION OF NUMERICAL SIMULATION FOR THE DETECTION AND ANALYZING ROUGH LANDINGS OF AIRCRAFT	491
<i>A. Rybin</i>	
NON-LINEAR STRUCTURAL DYNAMICS ASPECTS OF THE AERIAL REFUELLING BOOM SYSTEM	502
<i>F. Arevalo, S. Claverias, H. Climent</i>	
ANALYSIS OF FLIGHT LOADS AND STATIC AEROELASTICITY CHARACTERISTICS OF THE AIRPLANE WITH THE USE OF THREE-DIMENSIONAL AERODYNAMICS	518
<i>F.G. DiVincenzo, M.V. Kwiatkowska, R.V. Leonteva, D.V. Nekhaev</i>	

AIRCRAFT DYNAMIC LOADS WITH VARYING GEOMETRY AND FLIGHT MECHANICS EFFECTS	528
<i>M. Karpel, A. Romm, M. Reyes, H. Climent</i>	

SESSION 6: COMPUTATIONAL AEROELASTICITY 2

MULTIPLE INPUT DESCRIBING FUNCTION ANALYSIS OF NON-CLASSICAL AILERON BUZZ	545
<i>M.I. Zafar, F. Fusi, G. Quaranta</i>	
EFFICIENT ANALYSIS OF HALE AIRCRAFT STRUCTURE FOR STATIC AND DYNAMIC AEROELASTIC BEHAVIOR	561
<i>L. Liu, T. Kim, K.L. Lai</i>	
LIMIT-CYCLE-OSCILLATION SIMULATIONS OF AEROSTABIL WINDTUNNEL EXPERIMENTS	581
<i>B. Stickan, J. Dillinger, J. Nitzsche</i>	
OPENFSI INTERFACE FOR STRONGLY COUPLED STEADY AND UNSTEADY AEROELASTICITY	591
<i>C. Valente, D. Jones, A. Gaitonde, J.E. Cooper, Y. Lemmens</i>	
NON-LINEAR UNSTEADY AERODYNAMICS APPLICATION FOR AIRLINER FLUTTER RESEARCH	607
<i>A.V. Chuban, V.D. Chuban</i>	

SESSION 7: AERODYNAMICS/CFD 2

UNSTEADY VISCOUS-INVISCID COUPLING SIMULATIONS OF SEPARATED LAMINAR FLOWS AROUND 2D AIRFOILS	619
<i>J.I. Rothkegel, G. Dimitriadis</i>	
SONIC FATIGUE ON AFT-PYLON FARINGS	630
<i>M. Barth, S. Trapier, M. Berthomet, S. Rajan</i>	
CONTINUOUS-TIME STATE-SPACE UNSTEADY AERODYNAMIC MODELLING FOR EFFICIENT AEROELASTIC LOAD ANALYSIS	638
<i>N.P.M. Werter, R. DeBreuker, M.M. Abdalla</i>	
TRANSONIC LIMIT CYCLE OSCILLATION ANALYSIS OF AEROSTABIL WIND TUNNEL MODEL	656
<i>H. Arizono, K. Saitoh, M. Tamayama</i>	

SESSION 8: AEROELASTIC OPTIMISATION 1

A HIGH-EFFICIENCY AEROELASTIC OPTIMIZATION METHOD BASED ON KRIGING MODEL AND GENETIC ALGORITHM	662
<i>X. Wang, Z. Wan, C. Yang</i>	
RECENT ACHIEVEMENTS TOWARDS AERO-STRUCTURE GRADIENT COMPUTATION USING HIGH-FIDELITY CFD-CSM IN THE ONERA ELSA SOFTWARE	672
<i>C. Blondeau, T. Achard, P. Girodroux-Lavigne, R. Ohayon</i>	
GENETIC AND GRADIENT-BASED ALGORITHMS FOR THE MULTI-OBJECTIVE OPTIMIZATION OF AIRCRAFT DESIGN WITH AEROELASTIC CONSTRAINTS	692
<i>S. Gemma, F. Mastroddi</i>	
LOW-FIDELITY 2D ISOGEOMETRIC AEROELASTIC OPTIMIZATION WITH APPLICATION TO A MORPHING AIRFOIL	713
<i>E. Gillebaart, R. DeBreuker</i>	

SESSION 9: GVT & FLIGHT TEST 1

STATE-OF-THE-ART TECHNIQUES TO PERFORM AN INDUSTRIAL VIBRATION TEST CAMPAIGN AND A RAPID PROCESS TO UPDATE RENEWED FEM FOR CLEARANCE OF FIRST FLIGHT TEST	732
<i>C. Stephan, T.P. Vo-Hoang, S. Giclais, Y. Govers, P. Lubrina, M. Boeswald, A. Laporte</i>	

VOLUME 2

NONLINEAR GROUND VIBRATION IDENTIFICATION OF AN F-16 AIRCRAFT - PART II: UNDERSTANDING NONLINEAR BEHAVIOUR IN AEROSPACE STRUCTURES USING SINE-SWEEP TESTING	751
<i>T. Dossogne, J.P. Noel, C. Grappasonni, G. Kerschen, B. Peeters, J. Debillé, M. Vaes, J. Schoukens</i>	
NONLINEAR GROUND VIBRATION IDENTIFICATION OF AN F-16 AIRCRAFT PART I: FAST NONPARAMETRIC ANALYSIS OF DISTORTIONS IN FRF MEASUREMENTS	770
<i>M. Vaes, J. Schoukens, Y. Rolain, B. Peeters, J. Debillé, T. Dossogne, J.P. Noel, C. Grappasonni, G. Kerschen</i>	
STATE OF THE ART OF GVT TECHNOLOGY IN RUSSIA AND POSSIBLE DIRECTIONS TO INCREASE ACCURACY AND RELIABILITY	782
<i>P.G. Karkle, M.A. Pronin, M.M. Bogatyrev, G.V. Liseykin, K. Dijkstra</i>	

SESSION 10: AEROELASTICITY IN AIRCRAFT DESIGN 1

AEROELASTIC OPTIMIZATION OF WING SHAPE AND STRUCTURAL PARAMETERS FOR DIFFERENT AIRCRAFT CONFIGURATIONS	794
<i>K.A. Balunov, V.V. Chedrik, F.Z. Ishmuratov, P.G. Karkle</i>	
HIGH FIDELITY SIMULATION OF THE FOLDING WING TIP FOR LOADS ALLEVIATION	805
<i>J. Pattinson, T. Wilson, M. Herring</i>	
EXPERIENCE OF FLUTTER CLEARANCE OF THE SUCHOI SSJ 100 REGIONAL JET	821
<i>A.E. Orlov, S.E. Paryshev, S.V. Shalaev, S.I. Kalabuchov</i>	
DESIGN AND TESTING OF AN AEROELASTICALLY TAILORED WING UNDER MANOEUVRE LOADING	835
<i>N.P.M. Werter, J. Sodja, R. DeBreuker</i>	
AEROELASTIC TAILORING USING CRENELATED SKINS – MODELLING AND EXPERIMENT	851
<i>G. Francois, J.E. Cooper, P.M. Weaver</i>	

SESSION 11: NONLINEARITIES & UNCERTAINTIES

AEROELASTIC MODELING AND SIMULATION OF FLEXIBLE JET TRANSPORT AIRCRAFT WITH HIGH-ASPECT-RATIO WINGS	876
<i>R.C. Kitson, C.E.S. Cesnik</i>	
ASYMMETRIC LIMIT CYCLE OSCILLATIONS IN SYSTEMS WITH SYMMETRIC FREEPLAY	896
<i>G. Dimitriadis</i>	
THE AEROELASTIC TRIM AND STATIC STABILITY ANALYSIS OF HIGHLY FLEXIBLE AIRCRAFT	912
<i>R. Hu, C. Xie, Y. Liu</i>	
GEOMETRICAL NONLINEAR AEROELASTIC ANALYSIS OF LARGE AIRCRAFT WING	924
<i>C. Zhang, J. He, C. Xie, Y. Liu</i>	
EMBEDDING A MULTI-BODY MODEL OF A FIXED-WING AIRCRAFT IN A NONLINEAR STATE OBSERVER	940
<i>T.L. Benoit, Y.C. Lemmens, W.A. Desmet</i>	
BIFURCATION ANALYSIS OF THE AEROELASTIC GALLOPING PROBLEM VIA INPUT-OUTPUT PARAMETRIC MODELLING	959
<i>N.F. Giannelis, G.A. Vio</i>	
UNCERTAINTY QUANTIFICATION IN AEROELASTIC RESPONSE OF AN IDEALIZED COMPOSITE WING	970
<i>C.T. Nitschke, J. Mariani, A. Vincenti, D. Lucor, J.C. Chassaing</i>	
LIMIT-CYCLE OSCILLATIONS OF A PRETENSED MEMBRANE STRIP	984
<i>A. Drachinsky, D.E. Raveh</i>	

SESSION 12: LOADS ALLEVLATION

WIND TUNNEL EXPERIMENTAL VALIDATION OF FUTURE GREEN REGIONAL A/C GUST LOAD ALLEVIATION CONTROL SYSTEM	1010
<i>S. Ricci, S. Adden, C. Servadio, M. Karpel, J. Cooper</i>	

AEROELASTIC ANALYSIS MODELLING PROCESS TO PREDICT THE CRITICAL LOADS IN AN MDO ENVIRONMENT	1023
<i>R. Liepelt, V. Handojo, T. Klimmek</i>	
PROBABILISTIC ROBUST CONTROL STRATEGY FOR GUST LOAD ALLEVIATION	1039
<i>Y. Dai, C. Yang, C. Wang</i>	
INFLUENCE OF REGULAR CONTROL SYSTEM ON AIRCRAFT LOADS REPEATABILITY	1046
<i>A.S. Ustinov, V.I. Tsimbalyuk, T.I. Orlova</i>	
A COMPLETE EXPERIMENTAL INVESTIGATION OF GUST LOAD: FROM GENERATION TO ACTIVE CONTROL	1059
<i>A. Lepage, Y. Amosse, D. LeBihan, C. Poussot-Vassal, V. Brion, E. Rantet</i>	
DYNAMIC LOAD ALLEVIATION OF FLEXIBLE AIRCRAFT IN WAKE VORTEX ENCOUNTERS	1078
<i>H. Hesse, R. Palacios</i>	
INTEGRATED OPTIMIZATION OF AILERONS FOR ACTIVE GUST LOAD ALLEVIATION	1109
<i>M. Pusch, A. Knoblach, T. Kier</i>	

SESSION 13: AEROELASTIC RESPONSE & STABILITY

A PARAMETRIC AND TOPOLOGICAL STUDY ON THE USE OF VISCOELASTIC MATERIAL FOR FLUTTER SUPPRESSION	1124
<i>G.I. Barbejat, M.V. Donadon, R.G. Silva, A.M.G. deLima, A.G.C. Filho, L.S. Leao</i>	
A COMPARISON OF MODELING METHODS FOR THE SIMULATION OF FREE FLYING ELASTIC AIRCRAFT	1137
<i>K. Seywald, A. Wildschek, F. Holzapfel</i>	
COMPUTATIONAL BENCHMARK OF COMMERCIAL FLUID-STRUCTURE INTERACTION SOFTWARE FOR AEROELASTIC APPLICATIONS	1147
<i>N.F. Giannelis, G.A. Vio</i>	
INVESTIGATION OF UAV CONTROL SURFACES' CHARACTERISTICS	1163
<i>S.N. Gartsev, A.V. Dolgoplov, V.I. Smyslov</i>	
GUST RESPONSE ANALYSIS FOR HIGH-ASPECT RATIO WING	1174
<i>Y. Liu, C. Xie, C. Yang</i>	
A STATIC AEROTHERMOELASTIC RESPONSE ANALYSIS METHOD CONSIDERING HEAT FLUX UNCERTAINTY	1193
<i>N. Yi, Z. Wan, G. Li, C. Yang</i>	
THE AEROELASTIC IMPACT OF ENGINE THRUST AND GYROSCOPICS ON AIRCRAFT FLUTTER INSTABILITIES	1206
<i>S. Waitz, H. Hemmings</i>	
GYROSCOPIC FORCES INFLUENCE ON AEROELASTICITY CHARACTERISTICS OF AN AIRPLANE WITH ENGINES ON PYLONS UNDER THE WING	1221
<i>A. Kuznetsov, S. Kuzmina, F. Ishmuratov, V. Mosunov</i>	

SESSION 14: EXPERIMENTAL METHODS & BRIDGES

FLUTTER AND BUFFETING OF LONG SPAN SUSPENSION BRIDGES IN FULLY ERECTED AND PARTIALLY ERECTED CONDITIONS	1235
<i>M. Massaro, K.N. Bakis, D.J.N. Limebeer, M.J.R. Graham</i>	
RESEARCH ON DYNAMIC STABILITY OF AN ELASTIC MODEL USING TESTS IN ARTIFICIAL FLOW	1247
<i>G.V. Liseykin, M.M. Bogatyrev, M.A. Pronin, V.I. Smyslov</i>	
INVESTIGATION OF LOADING PARAMETERS OF A TRUNK-ROUTE AIRPLANE WING IN A WIND TUNNEL NEAR TO BUFFET BOUNDARY	1255
<i>N. Bragin, M. Garifullin, V. Yanin, S. Skomorokhov</i>	
EXPERIMENTS ON THE ACTIVE AEROELASTIC TEST BENCH (AATB) FOR THE IDENTIFICATION OF UNSTEADY AERODYNAMICS	1272
<i>J. Ertveldt, J. Schoukens, R. Pintelon, S. Vanlanduit</i>	
STRUCTURAL DYNAMIC INVESTIGATION OF ADAPTIVE WING DEMONSTRATOR WITHIN SADE PROJECT	1292
<i>G.A. Amiryants, V.P. Kulesh, V.A. Malyutin, A.V. Smotrov, A.V. Chedrik</i>	

SESSION 15: ROTATION SYSTEM

CROR BLADE DEFORMATION, PART 1: EXPERIMENTAL RESULTS BY STRAIN PATTERN ANALYSIS	1307
<i>A. Geeraert, C. Stephan</i>	
PERIODIC OUTPUT FEEDBACK CONTROL FOR HELICOPTER VIBRATION REDUCTION	1323
<i>C. Brillante, M. Morandini, P. Mantegazze</i>	
CROR BLADE DEFORMATION, PART 2: AEROELASTIC COMPUTATIONS AND COMPARISON WITH EXPERIMENTS	1338
<i>Y. Mauffrey, A. Geeraert, S. Verley</i>	
ALTERNATIVE PROBLEM FORMULATIONS FOR IDENTIFICATION OF MATHEMATICAL MODEL OF HELICOPTER ROTOR BLADE AND SOME PROBLEMS OF AEROELASTICITY ANALYSIS	1350
<i>V.Y. Eremín, S.E. Paryshev</i>	
INSTALLED COUNTER-ROTATING OPEN ROTOR WHIRL FLUTTER PHENOMENON INVESTIGATIONS USING ELSA SOLVER	1370
<i>S. Verley, A. Dugeai</i>	
ROTOR DYNAMICS OF COMPACT GAS TURBINE UNIT WITH GAS BEARINGS INVESTIGATION	1386
<i>J.M. Temis, M.J. Temis, A.M. Egorov</i>	
COMPRESSOR BLADE AND DISC OPTIMAL STRUCTURAL DESIGN	1394
<i>J.M. Temis, D.A. Yakushev</i>	

SESSION 16: COMPUTATIONAL AEROELASTICITY 3

DYNAMIC INSTABILITIES OF CIRCULATION CONTROLLED AEROFOILS	1408
<i>I. Krukow, N. Neuert, D. Dinkler</i>	
PREDICTION OF AEROELASTIC LIMIT-CYCLE OSCILLATIONS BASED ON HARMONIC FORCED MOTION OSCILLATIONS	1418
<i>A.C.L.M. vanRooij, J. Nitzsche, R.P. Dwright</i>	
INFLUENCE OF THE BOUNDARY LAYER ON FLUTTER OF ELASTIC PLATE IN SUPERSONIC GAS FLOW	1436
<i>V.O. Bondarev, V.V. Vedeneev</i>	
A CORRELATION STUDY OF MODAL PARAMETERS BETWEEN FLUTTER TESTING AND CFD SIMULATION	1453
<i>S. Orlando, M. Brughmans, T. Karaagacli, U. Ceyhan, O. Sumer, M.E. Cerit, B. Durak</i>	
KRYLOV SUBSPACE RECYCLING FOR LINEARISED AERODYNAMICS ANALYSIS USING DLR-TAU	1462
<i>S. Xu, S. Timme, K.J. Badcock</i>	

SESSION 17: AERODYNAMICS/CFD 3

ON THE VALIDITY RANGE OF PISTON THEORY	1480
<i>M.C. Meijer, L. Dala</i>	
A TRANSFER FUNCTION APPROACH TO MODEL UNSTEADY AERODYNAMICS	1500
<i>T. DeTroyer, J. Decuyper, M.C. Runacres</i>	

VOLUME 3

USING 2D-PIV MEASUREMENTS TO COMPUTE UNSTEADY AERODYNAMIC LOADS ON A FLAT PLATE AT HIGH ANGLE OF ATTACK	1509
<i>A. Guissart, L.P. Bernal, G. Dimitriadis, V.E. Terrapon</i>	
INTEGRATED FLEXIBLE DYNAMIC LOADS MODELS BASED ON AERODYNAMIC INFLUENCE COEFFICIENTS OF A 3D PANEL METHOD	1524
<i>T.M. Kier, M.J. Verveld, C.W. Burkett</i>	
AN ADVANCED PANEL METHOD FOR COMPRESSIBLE SUBSONIC UNSTEADY FLOW PAST COMPLEX GEOMETRIES	1545
<i>S.P. Fiddes, C.W. Burkett, T. Kier</i>	

SESSION 18: AEROELASTIC OPTIMIZATION 2

EVOLUTIONARY APPROACH TO STRUCTURAL DESIGN OF WING UNDER STRESS, BUCKLING AND AEROELASTICITY REQUIREMENTS	1563
<i>V.V. Chedrik, S.A. Tuktarov</i>	
A NOVEL METHOD FOR THE VIBRATION OPTIMISATION OF STRUCTURES SUBJECTED TO DYNAMIC LOADING	1572
<i>D.J. Munk, G.A. Vio, G.P. Steven</i>	
STATIC AEROELASTIC STIFFNESS OPTIMIZATION OF A FORWARD SWEEPED COMPOSITE WING WITH CFD CORRECTED AERO LOADS	1589
<i>J.K.S. Dillinger, M.M. Abdalla, Y.M. Meddaikar, T. Klimmek</i>	
A DASSAULT INDUSTRIAL APPROACH TO AERO-STRUCTURAL OPTIMIZATION	1609
<i>S. Meldrum, P. Hardy, G. Broux, E. Garrigues</i>	
AEROELASTIC TAILORING AND STRUCTURAL OPTIMISATION USING AN ADVANCED DYNAMIC AEROELASTIC FRAMEWORK	1625
<i>N.P.M. Werter, R. DeBreuker</i>	

SESSION 19: AEROELASTICITY IN AIRCRAFT DESIGN 2

MODELING OF DYNAMIC BEHAVIOR OF LATTICE COMPOSITE AIRCRAFT STRUCTURES	1645
<i>A. Bezuevsky, I. Kondakov, A. Shanygin, M. Zichenkov</i>	
STIFFNESS DISTRIBUTION AND AEROELASTIC PERFORMANCE OPTIMIZATION OF HIGH-ASPECT-RATIO WINGS	1658
<i>D. Ziliang, W. Zhiqiang, Y. Chao</i>	
ENHANCED FREE VIBRATION ANALYSIS OF COMPOSITE WING-BOX STRUCTURES BY ONE-DIMENSIONAL COMPONENT-WISE AND DYNAMIC STIFFNESS FORMULATIONS	1671
<i>E. Carrera, A. Pagani, P.H. Cabral, G. Silva, A. Prado</i>	
MULTIDISCIPLINARY COMPUTATIONAL SYSTEM "PARUS-INT" FOR DESIGN AND CERTIFICATION OF AIRPLANES IN STATIC AND DYNAMIC STRENGTH AND SERVICE LIFE	1680
<i>G.I. Turchanikov, M.M. Levchenko, V.V. Chedrik, D.V. Chemisov</i>	

SESSION 20: GVT & FLIGHT TEST 2

APPLICATION OF A MODERN ON-BOARD EXCITATION SYSTEM DURING THE IN-FLIGHT VIBRATION TESTING OF A BUSINESS JET	1699
<i>D.G. daSilva</i>	
AN EFFICIENT APPROACH FOR IN-OPERATION MODAL ANALYSIS OF FLUTTER FLIGHT TESTS	1719
<i>B. Jacquier, P. Vacher, S. Leroy, D. Walker</i>	
THE USE OF DYNAMIC STRAIN SENSORS AND MEASUREMENTS ON THE GROUND VIBRATION TESTING OF AN F-16 AIRCRAFT	1739
<i>F.L.M. dosSantos, B. Peeters, J. Debille, C. Salzano, L.C.S. Goes, W. Desmet</i>	
AIRPLANE GROUND TESTS WITH ROTATING FORCE SIMULATION	1751
<i>R.V. Leonteva</i>	

SESSION 21: AEROSERVOELASTICITY & ACTIVE CONTROL

NONLINEAR AEROSERVOELASTIC ANALYSIS FOR A THREE-DIMENSIONAL HORIZONTAL STABILIZER WITH AN ACTUATOR COMPOSED OF ELASTIC LINKS	1757
<i>Y.J. Kang, C.H. Chung, J.H. Jeon, S.J. Shin, Y.H. Na</i>	
SENSITIVITY BASED APPROACH FOR IMPROVED PREDICTIONS OF SERVO-ELASTIC RESPONSE OF A FLEXIBLE AIRCRAFT	1771
<i>P. Srinivasan, A. Joshi, I. Narayanaswamy, E. Hemalatha</i>	
EXPERIMENTAL AND NUMERICAL STUDY OF AN AUTONOMOUS FLAP	1789
<i>L.O. Bernhammer, S.T. Navalkar, J. Sodja, R. DeBreuker, M. Karpel</i>	
SUPPRESSION OF SIMULATED SELF-EXCITED OSCILLATION USING SMART MATERIALS ON FLEXIBLE WING STRUCTURE	1807
<i>N.A. Razak, N.S. Nasip, A.F. Hawari, G. Dimitriadis</i>	

RESEARCH EXPERIENCE OF AEROELASTIC VIBRATIONS OF THE UFV WITH ELECTROMECHANICAL ACTUATOR OF CONTROL FIN	1818
<i>V.I. Smysllov, A.V. Bykov, S.I. Sychev</i>	

SESSION 22: CRASHWORTHINESS

NUMERICAL SIMULATION OF DITCHING DYNAMIC LOADS	1835
<i>J.T. Viana, J. Romera, G. Pastor, L. Benitez, H. Climent, M.H. Siemann</i>	
CERTIFICATION OF LANDING GEAR STRUCTURE UNDER UERF EVENT	1855
<i>G. Vinas, C.M. Esteban, J. Manuel, M.P. Angel, P. Hernandez, J.P.S. Jose</i>	
EXPERIMENTAL DITCHING LOADS	1870
<i>H. Climent, G. Pastor, J.T. Viana, L. Benitez, A. Iafrati</i>	

SESSION 23: AEROELASTICITY OF MORPHING AIRCRAFT

INVESTIGATING THE BENEFITS OF MORPHING WING TIP DEVICES - A CASE STUDY	1890
<i>C. Wang, H.H. Khodaparast, M.I. Friswell</i>	
A GENERALIZED BEAM FORMULATION FOR THE DYNAMIC ANALYSIS OF CAMBER-MORPHING HELICOPTER BLADES	1905
<i>L. Cirrottola, M. Morandini, G. Quaranta</i>	
AEROELASTIC ANALYSIS OF A REGIONAL AIRCRAFT WITH ACTIVE CAMBER MORPHING DEVICE	1925
<i>A. DeGaspari, S. Ricci, L. Travaglini</i>	
TIME RESOLVED PIV MEASUREMENTS OF A HYBRID MORPHING NACA4412 AIRFOIL	1953
<i>J. Scheller, K.J. Rizzo, G. Jodin, E. Duhayon, J.F. Rouchon, G. Harran, M. Braza</i>	

SESSION 24: REDUCED ORDER MODELLING

STATIC AEROELASTIC ANALYSIS INCLUDING GEOMETRIC NONLINEARITIES BASED ON REDUCED ORDERED MODEL (ROM)	1966
<i>A. Chao, X. Changchuan, L. Yi, Y. Chao</i>	
NONLINEAR REDUCED-ORDER MODELING OF UNSTEADY AERODYNAMIC LOADS BASED ON DYNAMIC LOCAL LINEAR NEURO-FUZZY MODELS	1984
<i>M. Winter, C. Breitsamter</i>	
A REDUCED ORDER MODEL FOR DYNAMIC LOADS PREDICTION INCLUDING AERODYNAMIC NONLINEARITIES	2004
<i>D. Quero, W. Kruger, G. Jenaro</i>	
PARAMETRIC REDUCED ORDER MODEL FOR RAPID PREDICTION OF DYNAMIC LOADS AND AEROELASTIC RESPONSE WITH STRUCTURAL NONLINEARITIES	2024
<i>M. Castellani, Y. Lemmens, J.E. Cooper</i>	

SESSION 25: STRUCTURAL DYNAMICS & SHIMMY

MAIN LANDING GEAR DOOR DYNAMIC LOADS DUE TO UNSTEADY AERODYNAMICS: A PREDICTIVE AND VALIDATED METHODOLOGY	2045
<i>R. Abarca, D. Arenillas, O. Castro, B. Masia, E. Menga, M. Barth</i>	
NONLINEAR DYNAMIC ANALYSIS OF ASSEMBLED AIRCRAFT STRUCTURES WITH CONCENTRATED NONLINEARITIES	2066
<i>E. Menga, S. Hernandez, S. Moledo, C. Lopez</i>	
AERIAL DELIVERY DYNAMIC LOADS	2080
<i>A.P. delaSerna, A.J.R. Jimenez, M. Oliver, H. Climent</i>	
STUDY OF SHIMMY IN INDUSTRIAL CONTEXT	2097
<i>L. Martin, V. Jacques, Y. Martin-Siegfried</i>	
EXPERIMENTAL METHODS OF STUDYING OF DYNAMIC CHARACTERISTICS OF AIRPLANE LANDING GEAR	2115
<i>A.V. Krapivko, V.N. Zadonskay, E.S. Kolyshev, S.E. Paryshev, E.A. Dubovsky</i>	

POSTER PRESENTATIONS

DESIGNING OF ELASTICALLY SCALED MODEL OF A HIGH ASPECT RATIO WING USING DIGITAL TECHNOLOGIES	2135
<i>O. Orlova</i>	
INFLUENCE OF THE STRUCTURAL ELASTICITY ON THE STATIC AND DYNAMIC EFFECTIVENESS OF CONTROL SURFACES WITH THE GEARED TAB	2142
<i>O.V. Zubakova, M.C. Zichenkov, A.V. Zubakov, F.Z. Ishmuratov, Y.A. Nayko, A.V. Khalo</i>	
SHIMMY OF WHEELS OF LANDING GEAR OF AIRCRAFT WITH LOCAL NONLINEARITIES.....	2151
<i>A.V. Krapivko</i>	
PECULIARITIES OF AIRCRAFT VARIABLE LOADING AND VIBRATION SUPPRESSION ABILITIES.....	2168
<i>V.I. Tsimbalyuk, T.I. Orlova, K.A. Mitenkov</i>	
APPLICATION OF IMPOSED MOTION METHOD FOR MODEL FLUTTER TESTS IN HIGH-SPEED WIND TUNNELS	2182
<i>B.D. Bryantsev</i>	
CFD/CSD APPROACH TO EVALUATE THE AEROELASTIC RESPONSE OF HYPERSONIC VEHICLE WING	2190
<i>J. Lv, L. Guo, F. Wang, Z. Liu</i>	
DEVELOPMENT OF AN UAV WITH A VARIABLE-SPAN MORPHING WING.....	2199
<i>J.S. Bae, J.H. Kim, S.Y. Lee, J.S. Park, J.S. Kim, I. Lee</i>	
ON THE INFLUENCE OF AIRCRAFT ENGINE COMPONENTS DAMAGE CAUSED BY FOREIGN OBJECTS INGESTION ON THE AEROELASTIC CHARACTERISTICS OF COMPRESSORS.....	2209
<i>V. Matsarenko, G. Melnikova, B. Shorr</i>	
FLIGHT DYNAMIC MODELLING AND NUMERICAL SIMULATION OF A FLAPPING WING ORNITHOPTER WITH PITCHING AND FLAPPING PHASE LAG.....	2223
<i>H. Djojodihardjo, A.S.S. Ramli</i>	
DEVELOPMENT OF FLIGHT PARAMETERS SIMULATION TECHNOLOGY FOR AN AIRCRAFT WITH COMPLEX CONTROL SYSTEM ON FLIGHT SIMULATORS FOR MORE PRECISE DEFINITION OF IN-SERVICE LOADS TO SOLVE THE STRENGTH STRUCTURAL AND LIFE PROBLEMS EFFECTIVELY	2236
<i>G.I. Turchanikov</i>	
METHOD OF PRELIMINARY ESTIMATION OF HIGHWAY SOLID-WEB BRIDGES UNDER THE WIND FORCING.....	2245
<i>K.S. Strelkov, M.S. Komarov, A.V. Kozichev, O.A. Markina, A.V. Bykovsky, B.A. Logunov, L.L. Teperin</i>	
Author Index	