

4th International Operational Modal Analysis Conference

(IOMAC 2011)

**Istanbul, Turkey
9-11 May 2011**

ISBN: 978-1-63266-853-0

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 International Operational Modal Analysis Conference (IOMAC)
All rights reserved.

Printed by Curran Associates, Inc. (2014)

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

IOMAC
c/o Francesco Benedettini
DICEAA University of L'Aquila
Via G. Gronchi, 18
67100 L'Aquila, Italy

Phone: 39 334 6646908
Fax: 39 086 1242303

francesco.benedettini@univaq.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: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

OPERATIONAL MODAL ANALYSIS ON LAMINATED GLASS BEAMS	1
<i>M. López Aenlle, F. Pelayo, L. M. Villa, J. Barredo, L. Hermanns, A. Fraile</i>	
INFLUENCE OF LOCALIZED DEFECT ON ROLLING ELEMENT BEARING VIBRATIONS	9
<i>M. Akbari Jami, M. R. Ashory, H. Ghoshchian, A. Bakhshizade</i>	
AMBIENT AND FORCED VIBRATION TESTS OF A BOX GIRDER CONCRETE BRIDGE MODEL	17
<i>A. C. Altunisik, A. Bayraktar, B. Sevim</i>	
COMPARISON OF MODAL PARAMETERS OF MULTI-STORY BUILDINGS OBTAINED BY DIFFERENT WAVELET FUNCTIONS	25
<i>Z. S. Asae, S. A. Anvar, Z. Sherafat</i>	
APPLICATION OF WAVELET SYSTEM IDENTIFICATION APPROACH BASED ON FREE RESPONSE OF STRUCTURE FROM THE IMPULSE EXCITATION	34
<i>Z. S. Asae, S. A. Anvar, Z. Sherafat</i>	
SCALING OF OPERATIONAL MODE SHAPES USING MASS-CANCELLATION METHODS	41
<i>M. M. Khatibi, M. R. Ashory, A. Malekjafarian</i>	
MODE SHAPES IDENTIFICATION FROM THE RESULTS OF WAVELET TRANSFORM: THEORY AND SIMULATION	49
<i>M. R. Ashory, M. Jafari, M. M. Khatibi, A. Malekjafarian</i>	
IDENTIFICATION OF TIME-VARIANT SYSTEMS USING WAVELET ANALYSIS OF FORCE AND ACCELERATION RESPONSE SIGNALS	58
<i>X. Xu, W. J. Staszewski, X. Xu, Z. Y. Shi, S. Fassois</i>	
SEISMIC REHABILITATION OF A 23-STORY RC BUILDING IN MEXICO CITY	66
<i>Jorge A. Avila</i>	
A NEW CRITERION FOR STRUCTURAL DAMAGE DETECTION USING OPERATIONAL MODAL ANALYSIS	74
<i>A. Bakhshizade, M. R. Ashory, H. Ghoshchian, M. Akbari. Jami</i>	
A NON MODEL-BASED DAMAGE DETECTION METHOD USING GENERALIZED FLEXIBILITY MATRIX	82
<i>A. Bakhshizade, M. R. Ashory, M. Masoumi, A. Salmani</i>	
ESTIMATION OF THE NONLINEAR BEHAVIOR IN A DYNAMIC SYSTEM	90
<i>Andrea Bellino, Luigi Garibaldi, Stefano Marchesiello</i>	
THE RECEPTANCE APPROACH TO COMPLEX OPERATIONAL MODE NORMALIZATION	98
<i>Dionisio Bernal</i>	
KALMAN FILTER DETECTION UNDER VARIABLE NOISE STATISTICS	105
<i>Dionisio Bernal</i>	
COMPARISON OF THE RESULTS INFERRED FROM OMA AND IEMA	111
<i>Kemal Beyen, Mustafa Kutanis</i>	
IDENTIFICATION OF CLOSELY SPACED MODES USING IBRAHIM TIME DOMAIN METHOD	120
<i>A. Malekjafarian, R. Brincker, M. R. Ashory, M. M. Khatibi</i>	
COMBINING GPS AND INTEGRATED SENSOR SIGNALS	127
<i>Jannick Balleby Hansen, Rune Brincker, Søren Mathiasen, Anders Jørgensen, Mads Bøgevad Knudsen, Ulf Tygesen</i>	
TIME SYNCHRONIZATION BY MODAL CORRELATION	134
<i>Rune Brincker, Anders Brandt</i>	
ONLINE DAMAGE DETECTION BY FICTIVE PARAMETER UPDATING	140
<i>Yalcin Bulut, Dionisio Bernal</i>	
EARTHQUAKE EARLY WARNING, RAPID RESPONSE, AND STRUCTURAL HEALTH MONITORING NETWORKS IN ISTANBUL	146
<i>Eser Çakti, Erdal Safak, Yavuz Kaya, Ebru Harmandar</i>	
TRAFFIC EXCITED VIBRATIONS ACTING ON PEDESTRIANS USING A HIGHWAY BRIDGE	154
<i>Reto Cantieni</i>	
AMBIENT VIBRATION TESTING OF THE MELOLAND ROAD OVERPASS	162
<i>Carlos E. Ventura, Juan C. Carvajal, Liam Finn, James Traber</i>	
DAMAGE DETECTION WITH TIME SERIES MODELING USING AMBIENT VIBRATION DATA: EXPERIMENTAL VERIFICATIONS	169
<i>Mustafa Gul, Necati Catbas</i>	

DAMAGE DETECTION OF A 4-SPAN BRIDGE SPECIMEN USING FIBER BRAGG GRATING (FBG) SENSORS	177
<i>Necati Catbas, Mustafa Gul, Masoud Malekzadeh, Il-Bum Kwon</i>	
REVELATIONS FROM AMBIENT SHAKING DATA OF A RECENTLY INSTRUMENTED UNIQUE BUILDING AT MIT CAMPUS	185
<i>M. Çelebi, N. Toksöz, O. Büyükoztürk</i>	
OUTPUT-ONLY ANALYSES IN ENVIRONMENTAL TESTING	193
<i>A. Agneni, G. Coppotelli, C. Grappasonni</i>	
ON THE USE OF TRANSMISSIBILITY FUNCTIONS IN OPERATIONAL MODAL ANALYSIS: AN OVERVIEW OF THE METHOD AND AN INTRODUCTION TO RECENT DEVELOPMENTS AND FUTURE WORK	205
<i>Christof Devriendt, Gert De Sitter, Tim De Troyer, Patrick Guillaume</i>	
STATISTICAL-BASED MODEL-FREE DAMAGE LOCALIZATION	218
<i>Michael Döhler, Laurent Mevel, Dionisio Bernal, Dominique Siegert</i>	
UNCERTAINTY QUANTIFICATION FOR STOCHASTIC SUBSPACE IDENTIFICATION OF MULTI-SETUP MEASUREMENTS	226
<i>Michael Döhler, Xuan-Binh Lam, Laurent Mevel, Palle Andersen</i>	
OUTPUT-ONLY PARAMETRIC IDENTIFICATION OF A SCALE CABLE-STAYED BRIDGE STRUCTURE: A COMPARISON OF VECTOR AR AND STOCHASTIC SUBSPACE METHODS	234
<i>Fotis P. Kopsaftopoulos, Panagiotis G. Apostolellis, Spilios D. Fassois</i>	
OUTPUT-ONLY IDENTIFICATION OF TIME-VARYING STRUCTURES VIA A COMPLETE FS-TARMA MODEL APPROACH	242
<i>M. D. Spiridonakos, S. D. Fassois</i>	
NON-STATIONARY RANDOM VIBRATION MODELLING AND IDENTIFICATION: AN OVERVIEW OF PARAMETRIC METHODS AND APPLICATIONS	250
<i>S. D. Fassois, M. D. Spiridonakos</i>	
OUTPUT-ONLY STRUCTURAL IDENTIFICATION OF THE ENGINEERING FACULTY EDIFICE A AT L'AQUILA	259
<i>Dora Foti, Michele Mongelli, Vincenzo Gattulli, Francesco Potenza, Alfredo M. Ceci</i>	
AERODYNAMIC EXCITATION OF NOISE BARRIER SYSTEMS AT HIGH-SPEED RAIL LINES – FATIGUE ANALYSIS	267
<i>Herbert Friedl, Michael Reiterer, Hannes Kari</i>	
VIBRATION SERVICEABILITY OF THE STRESS RIBBON FOOTBRIDGE WITH EXTERNAL TENDONS AND BEARINGS	275
<i>Saiji Fukada, Yasuo Kajikawa, Jyunichi Kawashima, Yoichi Hidehira, Meguru Tsunomoto</i>	
STRUCTURAL HEALTH MONITORING OF STAY CABLES USING THE MICROWAVE INTERFEROMETRY	283
<i>Carmelo Gentile</i>	
A NEW CRITERION FOR STRUCTURAL DAMAGE DETECTION USING ELECTROMECHANICAL IMPEDANCE TECHNIQUE	293
<i>H. Ghoshchian, M. R. Ashory, A. Bakhshizade, M. Akbari, Jami</i>	
OPERATIONAL MODAL ANALYSIS OF A HELICOPTER UAV FROM FLIGHT TESTS	301
<i>C. Grappasonni, G. Coppotelli, A. Agneni</i>	
DISTRIBUTED DYNAMICS APPROXIMATION THROUGH LUMPING AND FUZZY CLUSTERING: RELIABILITY AND VALIDITY ISSUES	310
<i>Ahcene Habbi, Madjid Kidouche</i>	
SPATIAL COHERENCY OF EARTHQUAKE-INDUCED GROUND ACCELERATIONS RECORDED BY 100-STATION OF ISTANBUL RAPID RESPONSE NETWORK	317
<i>Ebru Harmandar, Eser Cakti, Mustafa Erdik</i>	
CALCULATING DAMPING FROM RING-DOWN USING HILBERT TRANSFORM AND CURVE FITTING	325
<i>Hartono Sumali, Rick A. Kellogg</i>	
OPERATIONAL MODAL ANALYSIS ON TWO DIFFERENT HELICOPTER CONFIGURATIONS	333
<i>E. Camargo, N-J. Jacobsen, D. Strafacci</i>	
DYNAMIC PROPERTY ESTIMATION OF LIGHTWEIGHT AIRCRAFT STRUCTURES VIA OPERATIONAL MODAL ANALYSIS IN WIND TUNNEL AND IN-VACUO CONDITIONS	341
<i>Engin Kahraman, Melin Sahin</i>	
NEW TECHNIQUE FOR REAL-TIME MODAL IDENTIFICATION	349
<i>Yavuz Kaya, Erdal Safak</i>	

SELECTION OF REFERENCE POINTS BASED ON OPTIMUM DEFLECTIONS IN OPERATIONAL MODAL TESTING	357
<i>M. M. Khatibi, M. R. Ashory, H. Sarparast, A. Malekjafarian</i>	
A NEW FORMULA FOR OPTIMUM MAGNITUDE OF ADDITIVE MASS IN SCALING OF MODE SHAPES IN OMA	365
<i>M. M. Khatibi, M. R. Ashory, A. R. Albooyeh</i>	
DYNAMIC BEHAVIOUR OF A RAILWAY BRIDGE WITH BALLAST SUPERSTRUCTURE – FIELD TRIAL AND MODAL IDENTIFICATION	373
<i>Johannes Kirchofer</i>	
REAL TIME ESTIMATION OF MODAL PARAMETERS OF NON-STATIONARY SYSTEMS USING ADAPTIVE WAVELET FILTERING AND RECURSIVE LEAST SQUARE ALGORITHM	381
<i>Andrzej Klepka, Tadeusz Uhl</i>	
ASSESSMENT OF THE FREQUENCY DOMAIN DECOMPOSITION METHOD: COMPARISON OF OPERATIONAL AND CLASSICAL MODAL ANALYSIS RESULTS	389
<i>Aleks Kuyumcuoglu, Kenan Yuce Sanliturk</i>	
AMBIENT VIBRATION TESTING AND FINITE ELEMENT MODEL UPDATING OF A CONCRETE FOOTBRIDGE	403
<i>Fatemeh Hamid Lakzaeian</i>	
STRUCTURAL CONDITION EVALUATION OF BOX-GIRDER BRIDGE VIA SUBSTRUCTURAL ANALYSIS	412
<i>S. S. Law, Y. Ding</i>	
DAMAGE IDENTIFICATION OF A SEGMENT OF A BOX-SECTION GIRDER SUBJECT TO A MOVING LOAD	420
<i>S. S. Law, J. Li</i>	
OPERATIONAL MODAL ANALYSIS OF THE ATLANTIC PAVILION WOOD ROOF	429
<i>Maíra Ledesma, Jorge Rodrigues</i>	
JOINT INPUT-RESPONSE PREDICTIONS IN STRUCTURAL DYNAMICS	437
<i>Eliz-Mari Lourens, Geert Lombaert, Costas Papadimitriou</i>	
ADVANCED METHODOLOGIES FOR DYNAMIC TESTING AND CONTINUOUS MONITORING OF CIVIL INFRASTRUCTURES BASED ON OMA	446
<i>Filipe Magalhães, Álvaro Cunha, Elsa Caetano</i>	
A NEW METHOD FOR ESTIMATION OF RIGID BODY PROPERTIES FROM OUTPUT-ONLY MODAL DATA	454
<i>A. Malekjafarian, M. R. Ashory, M. M. Khatibi, M. Saber Latibari</i>	
FREQUENCY RESOLUTION AND NUMBER OF AVERAGES EFFECTS ON THE ACCURACY AND DISPERSION OF OPERATIONAL MODAL ANALYSIS RESULTS	462
<i>A. Cattaneo, S. Manzoni, M. Vanali</i>	
MODAL PARAMETER CHANGES OF LOWLY DAMPED CIVIL STRUCTURES DUE TO PEOPLE-STRUCTURE INTERACTION	473
<i>Marcello Vanali, Stefano Manzoni</i>	
INSTANTANEOUS FREQUENCY ESTIMATION AND ORDER TRACKING BASED ON KALMAN FILTERS	482
<i>O. Cardona-Morales, L. D. Avendano-Valencia, G. Castellanos-Domínguez</i>	
TIME DOMAIN IDENTIFICATION OF THE TENSILE FORCE IN METALLIC TIE-RODS	490
<i>G. Muscolino, C. Versaci, N. Maugeri, E. Lo Giudice</i>	
SPECTRA OF TRAFFIC LOADS ON SUSPENSION A BRIDGE	498
<i>Nurdan Memisoglu Apaydin, Erdal Safak</i>	
OPTIMAL DESIGN, DETECTION AND TRACKING OF DAMAGE IN A WING ATTACHMENT FITTING	507
<i>Danny L. Parker</i>	
EXPERIMENTAL SHIP HULL DYNAMIC CHARACTERIZATION USING OPERATIONAL MODAL ANALYSIS	517
<i>Gianpiero Rocca, Bart Peeters, Ryohei Ota</i>	
ENVIRONMENTAL TESTING AND OPERATIONAL DATA ANALYSIS FOR NON-LINEAR SPACECRAFT STRUCTURES	527
<i>Simone Manzato, Bart Peeters, Raphaël Van Der Vorst, Jan Debille</i>	
OPERATIONAL MODAL ANALYSIS OF TWO WIND TURBINES WITH FOUNDATION PROBLEMS	537
<i>F. Pelayo, M. López-Aenlle, A. Fernández-Canteli, R. Cantieni</i>	
MODAL MASSES ESTIMATION IN OMA BY A CONSECUTIVE MASS CHANGE METHOD	545
<i>F. Pelayo, M. López-Aenlle, P. Reynolds, A. Fernández-Canteli</i>	

A METHODOLOGY FOR CHECKING THE VALIDITY OF MASS CHANGES: THE CORRELATION FREQUENCY METHOD	553
<i>F. Pelayo, M. López-Aenlle, R. Brincker, A. Fernández-Canteli</i>	
OUTPUT-ONLY MODAL IDENTIFICATION FOR PREDICTION OF THE ELASTIC PERIOD OF MASONRY TOWERS.....	561
<i>C. Rainieri, G. Fabbrocino</i>	
A HYBRID AUTOMATED MODAL IDENTIFICATION ALGORITHM FOR STRUCTURAL HEALTH MONITORING APPLICATIONS.....	569
<i>C. Rainieri, G. Fabbrocino</i>	
AUTOMATIC SYSTEM IDENTIFICATION ALGORITHM FOR PROCESSING AMBIENT VIBRATION DATA.....	577
<i>Rafael Aguilar, Luís F. Ramos, Miguel Azenha</i>	
EXPERIMENTAL INVESTIGATION OF THE MAC BASED CRACK DETECTION TECHNIQUE FOR REPEATING STRUCTURES.....	585
<i>A. U. Rehman, K. Worden, J. A. Rongong</i>	
IDENTIFICATION AND QUANTIFICATION OF NONLINEARITIES ARISING FROM A CRACK OPERATING IN FLEXURAL AND TORSION MODE	593
<i>A. U. Rehman, K. Worden, J. A. Rongong</i>	
OPERATIONAL MODAL ANALYSIS FOR STRUCTURAL CONDITION EVALUATION OF A BRIDGE	601
<i>Jorge Rodrigues, Maira Ledesma</i>	
COMPARATIVE OPERATIONAL MODAL ANALYSIS: APPLICATION OF A SEMI-ACTIVE VIBRATION ABSORBER TO A MANUFACTURING MACHINE	609
<i>M. Schmidt, H. Atzrodt, C. Sabirin, G. De Rue, T. Melz</i>	
A METHOD FOR SIMPLIFYING COMPLICATED MULTIBODY MODELS FOR USE IN EXPERIMENTAL CONTROL.....	618
<i>Reinhard Schmidt, Mahyar Mahinzaeim</i>	
OPERATIONAL MODAL TESTING OF AN ARCH TYPE STEEL HIGHWAY BRIDGE USING SSI TECHNIQUE.....	630
<i>A. C. Altunisik, A. Bayraktar, B. Sevim</i>	
DETERMINATION OF CONCRETE BRIDGE AGEING BY STRUCTURAL HEALTH MONITORING.....	636
<i>Serdar Soyoz, Maria Q. Feng</i>	
APPLICATION OF OMA TO OPERATIONAL WIND TURBINE.....	641
<i>Dmitri Tcherniak, Jon Basurko, Oscar Salgado, Iker Urresti, Shashank Chauhan, Carlo E. Carcangiu, Michele Rossetti</i>	
ONLINE MODAL ANALYSIS OF A FLEXIBLE ROBOT DURING GRINDING	649
<i>Fatma Mokdad, Hung V. Vu, Marc Thomas, Farzad Rafieian, Zhaoheng Liu</i>	
OPERATIONAL MODAL MONITORING OF HIGH POWER HYDRO-ELECTRICAL GENERATORS	659
<i>Viet-Hung Vu, Marc Thomas</i>	
FULL-SCALE AMBIENT VIBRATION TEST OF HAGIA SOPHIA BELL-TOWER AFTER RESTORATION.....	667
<i>T. Türker, A. Bayraktar</i>	
OPERATIONAL MODAL ANALYSIS OF THE “GUGLIA MAGGIORE” OF THE “DUOMO” IN MILANO.....	675
<i>Busca Giorgio, Cappellini Anna, Cigada Alfredo, Vanali Marcello</i>	
OUTPUT-ONLY MODAL PARAMETER ESTIMATION FOR TIME-VARYING STRUCTURES USING A TIME-FREQUENCY-DOMAIN LEAST SQUARE APPROACH.....	685
<i>Si-Da Zhou, Ward Heylen, Paul Sas, Li Liu</i>	
Author Index	