Proceedings of the
Third European Conference on

STRUCTURAL CONTROL
July 12-15th, 2004, Vienna, Austria

Volume II
Contributed Sessions

Editors

Rainer Flesch
arsenal research, Vienna, Austria

Hans Irschik and Michael Krommer
Johannes Kepler University Linz, Austria

Steering Organization

European Association for the Control of Structures
President: Fabio Casciati, Italy
S1: Structural Dynamics and Control

S1-1: Modelling, Design and Dynamic Analysis I

Dynamic Effects Accompanying Diffusional Homogenization in Thin Films
D. Indeitsev and Y. Mochalova S1-7

Interaction of a Low-Frequency Mechanical System with a High-Frequency Electric Drive
V. Polyanskiy S1-11

Dynamic Problems of Nonlinear Oscillations and Control of Complex Crystalline Lattice
E. Aero, A. Fradkov, S. Vakulenko and B. Andrievsky S1-15

S1-2: Active Control I

Active Control of Flexible Structures Using Piezoelectric Actuators and Sensors with an Application to a Funnel-Shaped Structure
T. Nestorovic Trajkov, H. Köppe and U. Gabbert S1-19

Active Control Schemes for Managing Nonlinear Passive Devices
F. Casciati, M. Domaneschi and L. Faravelli S1-23

S1-3: Modelling, Design and Dynamic Analysis II

Numerical Methods in Electromechanical Coupled Field Problems
R. Lerch, M. Kaltenbacher and H. Landes; Sectional keynote lecture S1-27

Attenuation of Dynamic Effects of MDOF Hysteretic Structures: Two Examples
A. Baratta and O. Corbi S1-31

Non-Linear Formulation and Algorithmic Implementation of Tuned Mass Dampers
L. Ramos and R. Barros S1-35

Contributed Session S1 S1-0
Dynamics of Multibody Systems Including Hydraulic Actuators and Feedback Control
M. Dibold, J. Gerstmayr, R. Stadlmayr, H. Irschik and K. Schlacher S1-39

S1-4: Active Control II

Infinite-Dimensional Control of Piezoelectric Structures
A. Kugi; Sectional keynote lecture S1-43

S1-5: Modelling, Design and Dynamic Analysis III

Dynamic Analysis and Behavior of Infilled Frames Under Seismic Loading
P. Shankhla S1-47

Response Prediction of Multistory Buildings Using a Spline-Based Reconstructor
M. Limongelli S1-51

Earthquake Response of a 1:4 Scaled Three Story Steel Structure Seismically Isolated by FPS Type Sliding Isolation System
E. Uckan, W. Mourtaja, G. Onem and M. Erdik S1-55

Use of Control Techniques for Error Analysis of Real Time Dynamic Substructure Testing
M. Wallace, D. Wagg and S. Neild S1-59

Modeling of Seismic Propagation by Deterministic and Stochastic Pattern
A. Baratta and I. Corbi S1-63

S1-6: Active Control III

Eigenstructure Assignment by Derivative-Plus-Acceleration Feedback for Second-Order Linear Time-Invariant Control Systems
T. Abdelaziz and M. Valasek S1-67

The Application of the Acceleration Feedback in Semi-Active and Active Control of Building Structures
M. Przychodzki and R. Lewandowski S1-71

Contributed Session S1 S1-1
Vibration Attenuation of Uncertain Structures by Using Quantitative Feedback Theory
N. Luo, R. Villamizar, J. Vehi and J. Rodellar S1-75

S1-7: Modelling, Design and Dynamic Analysis IV

Dynamic Response Control of Truss Structures
P. Rosko S1-79

Simulation of Compressive Fracture in Brittle Solids with Multiple Cracks
A. Saimoto, Y. Imai and H. Nisitani S1-83

Multiple Support Excitation of a Single Degree of Freedom Experiment: Control Methodology and Testing
D. Virden, J. Norman, D. Wagg, A. Crewe and R. Severn S1-87

S1-8: Active Control IV

Implementation of an Active Mass Damper for Seismic Vibration Control of a Plane Frame Physical Model
C. Moutinho, A. Cunha, E. Caetano S1-91

Variational Crime for the Boundary Control of Structures
F. Bourquin, B. Branchet and M. Collet S1-95

Serviceability Control of an Intelligent Tensegrity Structure
B. Adam and I. Smith S1-99

S1-9: Modelling, Design and Dynamic Analysis V

Identification of the Hysteretic Bouc-Wen Model. A Limit Cycle Approach
F. Ikhouane and J. Rodellar S1-103

The Detection and Localization of an Attached Mass in Plates
G. Piatkowski and L. Ziemianski S1-107

Optimal Damping Allocation for Controlling the Torsional Seismic Response of Asymmetric-Plan Systems
L. Petti, B. Palazzo and M. De luliis S1-111

Contributed Session S1 S1-2
S1-10: Adaptive Control and Fuzzy Algorithms

Adaptive Backstepping Control of Hysteretic Base-Isolated Structures
F. Pozo, F. Ikhouane and J. Rodellar S1-115

Adaptive Control of Real-Time Dynamic Substructuring Experiments
S. Neild, D. Stoten, D. Drury and C. Taylor S1-119

Genetic Adapt Fuzzy Control of Structures Using Multiple MR Dampers
G. Yan and L. Zhou S1-123

S1-11: Modelling, Design and Dynamic Analysis VI

Finite Element Based Overall Design of Controlled Smart Structures
U. Gabbert, H. Köppe and T. Nestorovic Trajkov; Sectional keynote lecture S1-127

Modelling and Control of Stress and Strain by Eigenstrain
Y. Nyashin, V. Lokhov and V. Kiryukhin S1-131

Targeting Control of Unfolding of Space Structures Connected by Strings
B. Barkow, A. Steindl and H. Troger S1-135

Energy Management in Structural Control by Lumping the Active Force on the Frequency Range with Major Dynamic Interaction
A. Baratta and O. Corbi S1-139

S1-12: Optimal Control Methods I

Optimal Control Parameters of Flexible Multibody Systems with Contact
J. Gerstmayr, M. Stangl and H. Irschik S1-143

Optimal Control over the Motion of an Active Buoy
Y. Ispolov and A. Sukhanov S1-147
S1-13: Modelling, Design and Dynamic Analysis VII

Shape Control of Sub – Domains of Structures
M. Krommer; Sectional keynote lecture S1-151

Vibration Compensation of Slender Beams and Thin Shell Structures by Distributed Piezoelectric Patches
M. Nader, H.-G. von Garssen and H. Irschik S1-155

Design of Optimal Support Using the Stress and Strain Control Technique
V. Kiryukhin, Y. Nyashin and V. Lokhov S1-159

Stress and Strain Control in Engineering Structures by Eigenstrain
V. Lokhov, Y. Nyashin and V. Kiryukhin S1-163

S1-14: Optimal Control Methods II

Optimal Parameter of Tuned Liquid Column Damper Design for Damped SDOF Wind-Excited Structures
J.-C. Wu and Y.-C. Shen S1-167

Optimal Tracking of Stochastic Systems with Bounded Control Force
D. Iourtchenko and J. Menaldi S1-171

Optimal Thickness and Depth for Embedded Piezoelectric Actuators
K. Wu and H. Janocha S1-175

S1-15: Passive Control I

Tuned Liquid Column Damper – A Cheap Device for Control of Tall Building Vibrations
M. Hochrainer and F. Ziegler; Sectional keynote lecture S1-179

Liquid Column Vibration Absorbers for Rotational Vibration Control of Structures
A. Taflanidis, D. Angelides and G. Manos S1-183

Liquid Damper for Suppressing Horizontal and Vertical Motions of Footbridges
M. Pirner and S. Urushadze S1-187

Contributed Session S1
S1-16: Passive Control II

Passive Control of Structural Elements Considering Nonlinear Response
R. Heuer and C. Adam; Sectional keynote lecture  S1-191

Analytical Model for High Damping Elastomers Applied to Energy Dissipating Devices. Numerical Study and Experimental Validation
P. Mata, R. Boroschek, A. Barbat and S. Oller  S1-195

Impact Dampers for Structural Dynamic Control
K. Li and A. Darby  S1-199

S1-17: Passive Control III

New Design Methodology for Viscous Damped Structures Based on Performance Criteria
M. De Iuliis, B. Palazzo and L. Petti  S1-203

A Passive Robust Control Strategy: Base Isolation and Tuned Mass Damping
B. Palazzo, L. Petti and M. De Iuliis  S1-207

S1-18: Semi - Active Control I

Time Delay Effects on Semi – Active Control of Seismically Excited Nonlinear Structures
H. Temimi, S. El-Borgi, S. Choura and F. Sadek  S1-211

S1-19: Semi - Active Control II

Semi – Active Control of Seismic Response of Tall Building With Podium Structure Using Semi – Active Dampers by Pole Assignment Method
F. Amini and I. Tahernia  S1-215

Stability Control Analysis of 1-DOF System
M. Pasquino, M. Brigante, F. Fabbrocino and M. Modano  S1-219

Contributed Session S1  S1-5
A Novel Approach to Dynamic Force Control  
A. Reinhorn, M. Sivaselvan, S. Weinreber and X. Shao  
S1-223

A Semi – Active MR Damper-Brace System’s Control Law Applied to the Earthquake Benchmark Building  
M. Spizzuoco, A. Occhiuzzi and G. Serino  
S1-227