

# Table of Contents

## PREFACE

<b>Damage in Fibre-Reinforced Plastics; Its Nature, Consequences and Detection</b> F.L. Matthews	1
<b>Vibration of a Laminated Composite Plate with Closing Delamination</b> A.J. Żak, M. Krawczuk and W.M. Ostachowicz	17
<b>Experimental Facility for Simulating the Initiation and Propagation of Fatigue Damage in Bituminous Road Paving Materials</b> A.M. Hartman, D.B. Nolan and M.D. Gilchrist	27
<b>On the Thermoelastic Analysis of Impact Damage on Foam-Cored Sandwich-Construction Composites</b> J.M. Dulieu-Barton and L.E. Chapman	35
<b>Impact Damage Detection in Carbon Fibre Composites Using Neural Networks and Acoustic Emission</b> N. Liu, Q.M. Zhu, C.Y. Wei, N.D. Dykes and P.E. Irving	43
<b>A Finite Element and Experimental Study of Punch and Bulge Testing</b> W. Li, B. Rodgers, D.J. Brookfield, J.E. Mottershead, T.K. Hellen, R. Howard-Hildige, J. Jarvis, R. Lohr, A. Carlton and M.P. Whelan	55
<b>Visualisation and Dimension Reduction of Acoustic Emission Data for Damage Detection</b> D.L. Tunnicliffe, G. Manson, K. Worden and A. Martin	64
<b>Looking into the Crystal Ball: The Continued Need for Multiple Viewpoints in Damage Detection</b> D.C. Zimmerman	76
<b>Structural Integrity Analysis with Piezoelectric Patches</b> D.M. Castillo, C. Pardo de Vera and J.A. Güemes	91
<b>Development and Comparison of Low Profile Piezoelectric Sensors for Impact and Acoustic Emission (AE) Detection in CFRP Structures</b> A. Martin, J. Hudd, P. Wells, D.L. Tunnicliffe and D.K. Das Gupta	102
<b>Crack Detection in Metallic Structures Using Piezoceramic Sensors</b> C. Biemans, W.J. Staszewski, C. Boller and G.R. Tomlinson	112
<b>Damage Detection in Vibrating Composite Panels Using Embedded Fibre Optic Sensors and Pulsed-DPSI</b> M.P. Whelan	122
<b>Damage Localization in Reinforced Concrete Structures by Using Damping Measurements</b> C. Modena, D. Sonda and D. Zonta	132
<b>Structural Integrity of Welded Steel Structures</b> T.M. Roberts, A.W. Davies and K.M. Holford	142
<b>Mode and Transducer Selection for Long Range Lamb Wave Inspection</b> P.D. Wilcox, R.P. Dalton, M.J.S. Lowe and P. Cawley	152
<b>Acoustic Emission Source Location</b> K.M. Holford and D.C. Carter	162
<b>Innovative Developments in Systems Condition Monitoring</b> C. Cempel	172
<b>Development and Application of an Experimental Procedure for Detection Damage in Gears</b> D. Stabio and D. Storer	189
<b>Adaptive Fusion Devices for Condition Monitoring: An Overview of the NEURAL-MAINE Project</b> C. Kirkham, A. Long, O. Taylor and C. Isbell	197
<b>Adaptive Fusion Devices for Condition Monitoring: Local Fusion Systems of the NEURAL-MAINE Project</b> O. Taylor, J. MacIntyre, C. Isbell, C. Kirkham and A. Long	205
<b>Machine Level Diagnosis Tools for Condition Monitoring: Concentrator Units of the NEURAL-MAINE Project</b> A. Long, C. Isbell, C. Kirkham and O. Taylor	217

<b>Vibration-Based Damage Detection in Rotating Machinery</b> C.R. Farrar and T.A. Duffey	224
<b>Using Transmissibility Data to Assess Structural Damage</b> C. Mares, R. Ruotolo and C. Surace	236
<b>Crack Detection in Asymmetric Rotors</b> A.W. Lees and M.I. Friswell	246
<b>Applications of the Multiple Damage Location Assurance Criterion</b> E.J. Williams and A. Messina	256
<b>Towards a Nonlinear Identification Methodology for Mechanical Signature Analysis</b> J.A. Brandon	265
<b>Integrated Vehicle Health Management (IVHM) on Space Vehicles: A Space Shuttle Flight Experiment</b> J. Sirkis, B. Childers, L. Melvin, T. Peng, Y. Tang, J.J. Moore, E. Enright and C. Bovier	273
<b>Modelling of Vibrations and Prediction of Failure in Mine Hoisting Cables</b> S. Kaczmarczyk and W.M. Ostachowicz	281
<b>Fault Diagnosis of a Class of AFC Mining Equipment</b> X.Z. Sun, Q.M. Zhu, J.E.T. Penny and S.D. Garvey	291
<b>Tasks in Autonomous Manufacturing for Laser Beam Welding</b> E.W. Kreutz, S. Kaierle, M. Dahmen, B. Fürst, J. Kittel and R. Poprawe	301
<b>Identification of Damage in Large Scale Structures by Means of Measured FRFs - Procedure and Application to the 140-Highway-Bridge -</b> C.P. Fritzen and K. Bohle	310
<b>Damage Detection on a Prestressed Concrete Bridge and RC Beams Using Dynamic System Identification</b> J. Maeck and G. De Roeck	320
<b>Modal Parameters Identification of Buildings Using ARX Models and Seismic Experimental Data</b> D. Spina	328
<b>Damage Assessment in Steel Bridges</b> R. Pullin, D.C. Carter and K.M. Holford	335
<b>Crack Detection in Geometrically Segmented Beams</b> T.D. Chaudhari and S.K. Maiti	343
<b>Cyclostationary and Bilinear Approaches for Gears Vibrating Signals</b> L. Bouillaut and M. Sidahmed	354
<b>Modal Identification by Cross-Time-Frequency Estimators</b> P. Bonato, R. Ceravolo, A. de Stefano and F. Molinari	363
<b>Cross-Wavelet Analysis for Lamb Wave Damage Detection in Composite Materials Using Optical Fibres</b> W.J. Staszewski, G. Pierce, K. Worden and B. Culshaw	373
<b>Damage Location in Beams by Using Rigid-Body Constraints</b> C. Mares, J.E. Mottershead and M.I. Friswell	381
<b>Detecting Strain-Gauge Failures in Stress-Cycle Count Matrices</b> S.J. Hickinbotham and J. Austin	391
<b>A Frequency Domain Approach for Fatigue Life Estimation from Finite Element Analysis</b> A. Halfpenny	401
<b>Bridge Dynamics Misinterpretations due to Low Spatial Resolution and Closeness of Frequencies</b> L. Garibaldi, S. Marchesiello and D.J. Gorman	411
<b>CVA-BR against ARMAV: Comparison over Real Data from an Ambient Noise Excited Bridge</b> L. Garibaldi, E. Giorcelli, S. Marchesiello and M. Ruzzene	423
<b>Different Analysis Techniques Applied to Seismic Data from the 1997 Italian Earthquake</b> D. Spina, L. Garibaldi, S. Marchesiello, E. Giorcelli and A. Fasana	432