

Table of Contents

Preface

Conference Committee

Keynote Papers

| | |
|---|----|
| Fault Damage Power and Self-Recovery System of Machinery J.J. Gao, W.M. Wang, L.D. He and H. Xu | 3 |
| Acoustic Emission in Structural Health Monitoring K.M. Holford | 15 |

1. Damage Location and Quantification

| | |
|---|-----|
| Estimation of Crack Parameters through WFEM and Neural Network B. Li, J. Zhuo and Z.J. He | 31 |
| Modal Approach for Forced Vibration of Beams with a Breathing Crack L. Baeza and H.J. Ouyang | 39 |
| The Experimental Research of Delamination Damage Location Based on FBG Sensors Network in Solid Rocket Motor Shell X.L. Chang, X.Y. He, B. Jian and Z.L. Li | 47 |
| Sensor Triangulation for Damage Localisation in Composite Plates P. Kudela, W.M. Ostachowicz and A. Zak | 55 |
| Identification of Small Crack in Beam Structures Using Anti-Resonant Frequency and Wavelet Analysis D.S. Wang, D.Y. Shen and H.P. Zhu | 63 |
| Pseudo Strain Energy Density-Based Structural Damage Identification X.Q. Chen, H.P. Zhu and D.S. Wang | 71 |
| Removing the Ambiguity in Lamb Wave-Based Damage Localization P. Malinowski, T. Wandowski and W.M. Ostachowicz | 79 |
| Damage Localisation in Thin Panels Using Elastic Wave Propagation Method T. Wandowski, P. Malinowski and W.M. Ostachowicz | 87 |
| Transmission and Reflection Coefficients for Damage Identification in 1D Elements M. Krawczuk, M. Palacz, A. Zak and W.M. Ostachowicz | 95 |
| Probability of Fault Location in a Beam Structure Using the Spectral Element Method and the Spatial Wavelet Analysis M. Gherlone, R. Ruotolo and C. Surace | 101 |
| Semi-Quantitative Analysis of Defect in Pipelines through the Use of Technique of Ultrasonic Guided Waves P.W. Tse and X.J. Wang | 109 |
| Identification of Crack Parameters in a Cantilever Beam under Uncertain End Conditions Z.H. Wang, L. Jing, W.W. Zhang and H.W. Ma | 117 |
| Structural Damage Detection Accounting for Loss of Data in Wireless Network Sensors S.T. Quek, V.A. Tran and X.Y. Hou | 125 |

2. Developments in Signal Processing and Algorithms

| | |
|---|-----|
| Investigation Frequency Resolution Effect on Hilbert Spectrum for Instantaneous Vibration Impact Signal Analysis H.K. Li and Z.X. Zhang | 135 |
| Crack Detection in Pipe Structures by Lifting Wavelet Finite Element Method X.F. Chen, B. Li and Z.J. He | 143 |
| Feature Extraction from Spectral Data Using the Bayesian Evidence Framework J.J. Hensman and R.J. Barthorpe | 151 |

| | |
|---|-----|
| Application of Hilbert-Huang Transform Method on Fault Diagnosis for Wind Turbine Rotor | |
| Q. Huang, D.X. Jiang and L.Y. Hong | 159 |
| Ensemble Empirical Mode Decomposition for Machine Health Diagnosis | |
| J. Zhang, R.Q. Yan and R.X. Gao | 167 |
| Gearbox Fault Diagnosis Based on Vibration Signals Measured Remotely | |
| S. Al-Arbi, F.S. Gu, L.Y. Guan, A. Ball and A. Naid | 175 |
| The Response Characteristics of Various Impact Patterns on the Smart Bumper of Automotives | |
| Y. Hong, G.P. Wang, Y.G. Go, D.P. Hong and T.J. Chung | 181 |
| Application of Rotational Measurements in Stiffness Reconstruction of Beams and Frames | |
| Z. Zembaty and S. Kokot | 189 |
| Statistical Analysis of Frequency Estimation Methods of Vibration Signal | |
| J.P. Xuan, T.L. Shi, G.L. Liao and S.Y. Liu | 195 |

3.Damage Assessment

| | |
|--|-----|
| Implementation of Reliability-Based Criteria for Structural Integrity Assessment of Existing Structures | |
| D. Diamantidis | 203 |
| The Research of the Effective Moduli of Particle Reinforced Polymer Composites Based on Interface Debonding | |
| X.L. Chang, B. Jian and C. Ouyang | 211 |
| Residual Life Assessment of Electricity Pylons – A Case Study | |
| J.R. Maguire | 219 |
| Development of Delamination in Cross-Ply Laminates: Effect of Microstructure | |
| Z.R. Khokhar, I.A. Ashcroft and V.V. Silberschmidt | 229 |
| Damage Assessment of a Cracked Bar: Effect of Material Nonlinearity on Vibro-Impact Response | |
| V. Hiwarkar, V.I. Babitsky and V.V. Silberschmidt | 237 |
| Enhanced Assessment of the Remaining Service Life of a Steel Railway Bridge | |
| J. Leander, A. Andersson and R. Karoumi | 245 |
| Numerical and Experimental Investigation of the Sensing Area of Piezoelectric Elements for Damage Detection with the E/M Impedance Method | |
| K.J. Xing, R.T. Schulte and C.P. Fritzen | 253 |
| Statistical Damage Detection in a Smart Structure under Different Temperatures via Vibration Testing: A Global Model Based Approach | |
| J.D. Hios and S.D. Fassois | 261 |
| Assessment of the Condition of a Beam Using a Static Loading Test | |
| B.J. Walsh and A. González | 269 |
| A Review on Advances of Damage Identification Methods Based on Vibration | |
| J.X. Yan, C.S. Liu, T.Z. Liu and L.L. Zhao | 277 |
| Studies on Wavelet Packet-Based Crack Detection for a Beam under the Moving Load | |
| W.W. Zhang, Z.H. Wang and H.W. Ma | 285 |
| Development of Many-Angular Pin Type Load Cell for a Overload Limiter of a Movable Crane | |
| D.S. Han, J.M. Ha and G.J. Han | 291 |
| Spur Gear Crack Propagation Assessment Using Model-Based Analysis and Simulation | |
| Z.G. Tian and M.J. Zuo | 299 |
| Crack Size Estimation Using a Combination of Cross Correlation and Phase Shift Correction in Ultrasonic Time-of-Flight Diffraction Method | |
| Y.H. Zhang, M.J. Zuo and X.D. Wang | 305 |
| Influence of Fatigue Loading on the Engineering Critical Assessment of Steel Catenary Risers in Sour Deepwater Oil and Gas Developments | |
| C.M. Holtam, D.P. Baxter, R.C. Thomson and I.A. Ashcroft | 313 |
| The Effects of Blockage on the Propagation of Acoustic Waves in the Liquid-Shell Coupled System | |
| W.B. Duan, F.S. Gu, I. Dupère, S. Zhong and A. Ball | 327 |

| | |
|--|-----|
| Fractal Theory Based Damage Assessing Method of Acoustic Emission Test Y. Huang, H. Li, X. Yan and J.P. Ou | 335 |
| Results of Nondestructive Inspection of Layered Composites Using IR Thermography and Ultrasonics N. Constantin, A. Mihai, V. Anghel, M. Găvan, Ș. Sorohan, W. Hillger and M. Sheerer | 343 |
| Bayesian Logic Applied to Damage Assessment of a Smart Precast Concrete Element D. Zonta, M. Pozzi, H.Y. Wu and D. Inaudi | 351 |
| Assessment, Strengthening and Validation of Prestressed Damaged Beams L. Della Sala, R. Cerone, A. Gennari Santori and M. Tommasini | 359 |
| Detection of Various Damages Based on Piezoceramic Optical Fiber Sensor Y. Hong, G.P. Wang, S.H. Hwang, H.S. Kim and D.P. Hong | 367 |
| Applicaton of Modal Filtration for Damage Detection of Rotating Shaft K. Mendrok, J. Bednarz and T. Uhl | 373 |

4. Condition Monitoring

| | |
|--|-----|
| On Optimal Sensor Placement Criterion for Structural Health Monitoring with Representative Least Squares Method D.S. Li, H.N. Li and C.P. Fritzen | 383 |
| FE Model Updating for Damage Detection – Application to a Welded Structure N.A. Husain, A. Snaylam, H.H. Khodaparast, S. James, G. Dearden and H.J. Ouyang | 393 |
| Monitoring Vertical Loads on the Bearings of the High Coast Suspension Bridge R. Karoumi, K. Svedjetun and S. Gilliusson | 401 |
| The Design of Piezoelectric Transducer for Structural Health Monitoring Using Longitudinal Vibration Modes X.L. Liu and Z.W. Jiang | 407 |
| Particle Impact Damping in Two Dimensions R.A. Bhatti, Y.R. Wang and Z.C. Wang | 415 |
| Smart Rotating Machines for Condition Monitoring M.I. Friswell and Y.Y. He | 423 |
| GA-SVR Based Bearing Condition Degradation Prediction F.Z. Feng, D.D. Zhu, P.C. Jiang and H. Jiang | 431 |
| Harvesting Vibration Energy for Structural Health Monitoring in Aircraft C.A. Featherston, K.M. Holford and B. Greaves | 439 |
| Condition Monitoring of Textiles Using Optical Techniques C.C. Ye, J.M. Dulieu-Barton, A.R. Chambers, F.J. Lennard and D.D. Eastop | 447 |
| Application of Compressive Sampling for Accelerometer Signals Used in Structural Health Monitoring Y.Q. Bao, J.L. Beck and H. Li | 455 |
| Research on Real-Time Process Monitoring Technology and System for High-Speed Turbopump L.R. Xia, N.Q. Hu and G.J. Qin | 463 |
| Gearbox Condition Estimation Using Cyclo-Stationary Properties of Vibration Signal R. Zimroz and W. Bartelmus | 471 |
| Analysis of the Response of a Rotor System Containing a Breathing Crack J.J. Sinou | 479 |
| Thermoelectric Energy Harvesting for Wireless Sensor Systems in Aircraft C.A. Featherston, K.M. Holford and G. Waring | 487 |
| Condition Monitoring of CI Engine Running on Biodiesel Using Transient Process B. Tesfa, R. Mishra, F.S. Gu and A. Ball | 495 |
| Bispectrum Analysis of Motor Current Signals for Fault Diagnosis of Reciprocating Compressors A. Naid, F.S. Gu, Y.M. Shao, S. Al-Arbi and A. Ball | 505 |
| Experimental Study on Rubbing Acoustic Emission for Rotor-Bearing System Based on Parameter Analysis Y.Y. He and X.Y. Yin | 513 |
| Investigation of Condition Monitoring of a Flap System F. Lu and Q. Chen | 521 |

5. System Diagnostics and Prognosis

| | |
|--|-----|
| Non-Linear Identification of a RC Element Using Time-Frequency Instantaneous Estimators | |
| G.V. Demarie, D. Sabia and R. Ceravolo | 531 |
| A Steam Turbine Fault Diagnostic System Based on the Web and Database Technologies | |
| G.X. Song, Y.J. Gu, Y.Y. He and F.L. Chu | 539 |
| Research on the Fault Diagnosis Technology of Diesel Engine Based on the Instantaneous Speed | |
| Y. Hu, R.P. Zhou and J.G. Yang | 547 |
| Diagnose and Analysis of Coupling Faults on Nonlinear Rotor-Bearing-Seal System Prediction | |
| S.L. Liu, A. Li and S.Y. Zheng | 553 |
| Fault Recognition Method of Rolling Bearings Based on Volterra Series and HMM | |
| J. Jiang and Z.N. Li | 561 |
| A Novel Fault Diagnosis Method Using PCA and ART-Similarity Classifier Based on Yu's Norm | |
| Z.B. Xu, J.P. Xuan, T.L. Shi, B. Wu and Y.M. Hu | 569 |
| Wavelet Selection for Bearing Defect Diagnosis | |
| R.Q. Yan and R.X. Gao | 575 |
| Research on Nonlinear Process Monitoring and Fault Diagnosis Based on Kernel Principal Component Analysis | |
| F. He, M. Li, J.H. Yang and J.W. Xu | 583 |
| Shaft Crack Analysis and Diagnosis for the 600MW Steam Turbine Generator | |
| D.X. Jiang, L.Y. Hong and Q. Huang | 591 |
| Experimental Investigation of Pedestal Looseness in a Rotor-Bearing System | |
| W.X. Lu and F.L. Chu | 599 |
| Fault Diagnostics Based on Pattern Spectrum Entropy and Proximal Support Vector Machine | |
| X.T. Yu, W.X. Lu and F.L. Chu | 607 |
| Signal Processing by Energy Normalization Method Based on Wavelet Packet | |
| T. Chen, X.L. Xu and S.H. Wang | 613 |
| Application of Cyclic Correlation Analysis to Gear Damage Detection | |
| Z.P. Feng, M.J. Zuo, R.J. Hao and F.L. Chu | 621 |
| Feature Extraction for Damage Detection in Structures Based on Nonlinearity Analysis | |
| Z.K. Peng, Z.Q. Lang, C. Wolters and S.A. Billings | 627 |
| Diagnosis of Rolling Elements Bearing Based on Inverse Autoregressive Filter | |
| L. Garibaldi, G.F. Wang, S. Marchesiello and A. Fasana | 635 |
| Time-Varying Output-Only Identification of a Cracked Beam | |
| A. Bellino, L. Garibaldi and S. Marchesiello | 643 |
| Defects Diagnosis of Bearing by Means of Acoustic Emission and Continuous Wavelet Transform | |
| R.J. Hao, Z.P. Feng and F.L. Chu | 651 |

6. Damage Mechanisms

| | |
|--|-----|
| Particle Swarm vs. Evolutionary Optimization Techniques in a Multiobjective Framework for Damage Identification | |
| R. Perera, S.E. Fang and A. Ruiz | 661 |
| Damage Identification Using Response Surface Methodology | |
| S.E. Fang and R. Perera | 669 |
| Simulations of a Dual-Rotor System with Local Rub-Impacts Based on Rigid-Flexible Multi-Body Model | |
| Q.K. Han, H.T. Luo and B.C. Wen | 677 |
| Spectral Element Modelling of Wave Propagation and Impedance Based SHM Systems | |
| R.T. Schulte, K.J. Xing and C.P. Fritzen | 683 |

| | |
|--|-----|
| Numerical Study of Thickness Distribution of Stretch-Blow Bottles for Defects Prediction Y.Y. Pan, S.Y. Zheng and X.H. Pan | 691 |
| Experimental Verification and Comparison of Mode Shape-Based Damage Detection Methods M. Radziński, M. Krawczuk and W.M. Ostachowicz | 699 |
| Modal Identification of an Experimental Model of Masonry Arch Bridge G. Ruocci, R. Ceravolo and A. de Stefano | 707 |

7. Fatigue Damage

| | |
|---|-----|
| Study and Application of Grey System Theory for Fatigue Life Prediction X.L. Wang, H. Nie and Q. Jiang | 717 |
| Life Prediction of Stainless Steels under Creep-Fatigue X.C. He | 725 |
| Dynamic Behaviour of Single Lap-Jointed Cantilevered Beams X.C. He | 733 |
| Fatigue Damage Evaluation and Retrofit of Steel Orthotropic Bridge Decks C.S. Wang, Y.C. Feng and L. Duan | 741 |
| Fatigue Safety Evaluation of Existing Reinforced Concrete Bridges C.S. Wang, X.H. Dong, W.H. Miao and G. Li | 749 |
| Fatigue Properties Assessment of Corroded Cable C.M. Lan and H. Li | 757 |

8. Structural Integrity and Advanced Methods of NDT

| | |
|---|-----|
| Influence of Disbond Defects on the Dispersion Properties of Adhesive Bonding Structures X.L. Chang, T. Ni and C. Ai | 767 |
| Integrity Strain Response Analysis of a Long Span Cable-Stayed Bridge S.L. Li, H. Li, J.P. Ou and H.W. Li | 775 |
| Updating of Finite Element Model in Considering Mode Errors with Fuzzy Theory Y. Liu, Z.D. Duan and H. Li | 785 |
| A Method for Acoustic Emission Source Identification Based on Optimisation A. Spencer, K. Worden and G. Pierce | 793 |
| Automatic Image Measurement Technology in Endoscopy NDT G.J. Liu, Y. Zhang, J. Qiu and K.H. Lu | 803 |
| Acoustic Emission Monitoring of Mechanical Seals Using MUSIC Algorithm Based on Higher Order Statistics Y.B. Fan, F.S. Gu and A. Ball | 811 |