

# Table of Contents

**Preface****Committees****Sponsors**

## Measurement Lecture

<b>Techniques for Experimental Measurement of Fatigue Crack Closure</b>	1
D. Nowell	3

## Keynotes

<b>Advances and Challenges in Structural Integrity</b>	11
A.H. Sherry	13
<b>Failure Modes of Sandwich Structures</b>	23
E.E. Gdoutos	

## Structural Integrity

<b>Monitoring Creep Strain in Power Station Engineering Plant</b>	29
A. Morris, J.P. Dear, M. Kourmpetis, C. Maharaj, A. Puri and A.D. Fergusson	31
<b>Improved Correlation of Measured and Predicted Hysteresis Loops in a Multiaxial Fretting Fatigue Test Rig for Spline Couplings</b>	37
D. Houghton, P.M. Wavish, E.J. Williams and S.B. Leen	37
<b>Fretting Fatigue Apparatus for Shrink-Fitted Shaft Assembly</b>	43
C. Santus, L. Bertini and M. Beghini	43
<b>Experimental Study on the Material Response of Laser Weldment under Dynamic Loading</b>	49
J. Fang	49

## Inverse Problems

<b>Software Implementation of the Virtual Fields Method</b>	55
V. Tran, S. Avril and F. Pierron	57
<b>Using Airy Function to Thermoelastically Separate Stresses in a Central Circularly Perforated Plate</b>	63
S.J. Lin, D.R. Matthys and R.E. Rowlands	63
<b>Identification of Material Properties Using FEMU: Application to the Open Hole Tensile Test</b>	73
G. Silva, R. Le Riche, J. Molimard, A. Vautrin and C. Galerne	73

## Mechanical Modelling

<b>The Determination and Evaluation of Nitinol Constitutive Models for Finite Element Analysis</b>	79
E. McCummiskey, W.M. Dempster, D.H. Nash, T.R. Ashton and D.G. Stevenson	81
<b>Plotting of Isoclinic Phasemap from Finite Element Results and its Use in Digital Photoelasticity</b>	89
K. Ashokan and K. Ramesh	89
<b>Theoretical and Experimental Working Life Comparison for a Helical Gear under Linear Pitting Failure</b>	95
M.A. Khan and A.G. Starr	95

<b>Mechanical Behavior of a Calcium Phosphate Ceramic Bone Graft Used in the Rehabilitation of a C4 Human Vertebra</b>	
J.A. Beltrán-Fernández, L.H. Hernández-Gómez, R.G. Rodríguez-Cañizo, G. Urriolagoitia-Calderón, G. Urriolagoitia-Sosa, A. González-Rebatú and M. Dufou-Olvera	101
<b>Experimental Structural Analysis of Pedestal Mounted Stinger System Turret</b>	
M. Çelik	107
<b>Welded Structures</b>	
	117
<b>Tensile Properties and HAZ Definition for TIG and EB Welds Using Electronic Speckle Pattern Interferometry (ESPI)</b>	
Y. Kyriakoglou, M. Preuss and P. Bowen	119
<b>Determination of Weld Metal Mechanical Properties Utilising Novel Tensile Testing Methods</b>	
M. Kartal, R.M. Molak, M. Turski, S. Gungor, M.E. Fitzpatrick and L. Edwards	127
<b>The Application of the Hole Drilling Method to Define the Residual Stress of Dissimilar Laser Welded Components</b>	
E.M. Anawa and A.G. Olabi	133
<b>Assessment and Minimization of the Residual Stress in Dissimilar Laser Welding</b>	
K.Y. Benyounis, A.G. Olabi and J.H. Abboud	139
<b>NDE</b>	
	145
<b>Confidence of Detection of Fracture Signals Using Acoustic Emission</b>	
R. Pullin, K.M. Holford and S.L. Evans	147
<b>Evaluation of Sub-Surface Stresses Using Thermoelastic Stress Analysis</b>	
N. Sathon and J.M. Dulieu-Barton	153
<b>Monitoring the Evolution of Fatigue in Corrugated Paperboard under Random Loads</b>	
M.A. Garcia-Romeu-Martinez, V. Rouillard, M.A. Sek and V.A. Cloquell-Ballester	159
<b>Micromechanical Testing</b>	
	165
<b>Local Strain Measurement in Hot Deformed Microstructures</b>	
C. Pinna and Y.J. Lan	167
<b>Local Plastic Strain Measurement by EBSD</b>	
M. Kamaya, J.Q. da Fonseca, L.M. Li and M. Preuss	173
<b>Development of a Full-Field Displacement Measurement Technique at the Microscale and Application to the Study of Strain Fields in a Tensile Steel Specimen</b>	
R. Moulart, R. Rotinat, F. Pierron and G. Lérondel	181
<b>Use of Micro Tensile Test Samples in Determining the Remnant Life of Pressure Vessel Steels</b>	
R.M. Molak, M. Kartal, Z. Pakiela, W. Manaj, M. Turski, S. Hiller, S. Gungor, L. Edwards and K.J. Kurzydlowski	187
<b>An Innovative Measuring Method of Young's Modulus for Thin Flexible Multi-Layered Materials Using Cantilever</b>	
A. Ohtsuki	195
<b>Impact of Composites</b>	
	201
<b>Collapse of Glass/Carbon Fibre Circular Cylinders under Uniform External Pressure</b>	
C.T.F. Ross, M. Engelhardt and A.P.F. Little	203
<b>Reconstruction of Impact Loads within Fibre Reinforced Polymers</b>	
C.R. Koenig, D.H. Mueller, O. Focke and M. Calomfirescu	209
<b>The Effect of the Impactor Diameter and Boundary Conditions on Low Velocity Impact Composites Behaviour</b>	
A.M. Amaro, P.N.B. Reis, A.G. Magalhães and M.F.S.F. de Moura	217

<b>Effect of Laminate Configurations on Impact Properties of GFRP Composite in Seawater</b>	223
S.K. Srivastava and I.P. Singh	
 <b>Impact and High Strain Rate</b>	
	229
<b>Strain Rate Effects in Crushable Structural Foams</b>	231
R.A.W. Mines	
<b>Identification of a Lumped-Parameter Model for Golf Balls in Normal Impact</b>	237
K. Nakai and T. Yokoyama	
<b>Interpreting Shock Data to Estimate Drop Height Levels During Handling</b>	243
M.A. Garcia-Romeu-Martinez, M.A. Sek, V. Rouillard and V.A. Cloquell-Ballester	
<b>High Strain-Rate Compressive Response of Friction Stir Welded AA7075-T651 Joints</b>	251
T. Yokoyama and K. Nakai	
 <b>Dynamic Loading</b>	
	257
<b>Load Pulse Determination in Gas Gun Impact Tests</b>	259
S.A. Ritt and A.F. Johnson	
<b>Error Estimations in Digital Image Correlation Technique</b>	265
T. Siebert, T. Becker, K. Spiltthof, I. Neumann and R. Krupka	
<b>Modelling the Uniaxial Impact Response of a Nonlinear Sandwich Structure with Interlaminar Buckling</b>	271
M.A. Sek	
<b>The Application of an Active Vibration Regulation System to Improving Driving Comfort in Convertible Vehicles: A Comparative Study of Regulator Design Methodologies</b>	277
M. Mahinzaeim, J.M. Hale, D.C. Swailes, R. Schmidt and B. Johanning	
<b>Characterisation of the Nonlinear Behaviour of Expanded Polystyrene Cushions</b>	283
M.A. Sek, V. Rouillard and A. Parker	
<b>Dynamic Mechanical Properties of Polypropylene Syntactic Foam with Polymer Microballoons</b>	289
H. Mae, M. Omiya and K. Kishimoto	
<b>Vibration Based Damage Diagnosis of an Aircraft Structure Using Piezoelectric Transducers</b>	295
J. Käsgen and D. Mayer	