

Table of Contents

Preface

Two-Dimensional X-Ray Diffraction for Structure and Stress Analysis B.B. He, K.W. Xu, F. Wang and P. Huang	1
Diffraction Stress Analysis Using Direction Dependent Grain-Interaction Models U. Welzel, S. Fréour, A. Kumar and E.J. Mittemeijer	7
Mechanics of End Effects in Thin Film and Substrate Stress Distributions C.E. Murray and I.C. Noyan	13
Application of X-Ray and Neutron Diffraction Methods to Reliability Evaluation of Structural Components and Electronic Device M. Hayashi and S. Okido	19
Multiscale Study of Internal Stress and Texture in Ferroelectrics E. Üstündag, R.C. Rogan, M.R. Daymond, N. Tamura, L. Margulies and H.F. Poulsen	28
FaME38 - Improving the Effectiveness of Strain Measurements A. Steuwer, D.J. Hughes, Z.F. Chen, B. Malard, N. Ratel, M. Turski and P.J. Webster	29
Evaluation of Local Stress Distribution Near Notch and Crack Tips in Al₂O₃ by Synchrotron Radiation Y. Sakaida, Y. Sawaki, K. Tanaka and Y. Akiniwa	35
Residual Stresses around an Expanded Hole in an Aluminum Clad Sheet P. Matos, P.M.G.P. Moreira, J.C.P. Pina, A.M. Dias and P.M.S.T. de Castro	41
Influence of Transformation Plasticity on Residual Stresses and Distortions due to the Heat Treatment of Steels with Different Carbon Content C. Franz, G. Besserdich, V. Schulze, H. Müller and D. Löhé	47
Residual Stress Prediction in Dissimilar Metal Weld Pipe Joints Using the Finite Element Method D.E. Katsareas and A. Youtsos	53
An Advanced Residual Stress Determination for 3D Cylinder Structure J. Luo, G. Montay and J. Lu	62
Modelling of the Ultrasonic Shot Peening Process C. Pilé, M. François, D. Retraint, E. Rouhaud and J. Lu	67
Effect of Graphite Inclusions on Mechanical Properties of Austempered Ductile Iron F. Serban, A. Baczanski, E. Labbe, K. Wierzbanski and A. Lodini	73
3-D Finite Element Simulation of Welding Residual Stresses in Pipe-Flange Joints: Effect of Welding Parameters M. Siddique, M. Abid, H.F. Junejo and R.A. Mufti	79
Numerical Simulation of Thermal Stress in Castings Using FDM/FEM Integrated Method X. Xue, J. Tian and G. Xiu	85
Determination of Residual Stress Distribution in Autofrettaged Tube Based on Modified Yielding Criterion and Tensile-Compressive Curve of Material X.P. Huang and W. Cui	91
Thermal Stress Relief in 7050 Aluminum Forgings by Uphill Quenching Q.C. Wang, L.T. Wang and W. Peng	97
Reduce the Residual Stress of Welded Structures by Post-Weld Vibration D.L. Rao, Z.Q. Zhu, L.G. Chen and C. Ni	102
Effect of Stress Wave in the Course of Metal Machining L.T. Wang and Q.C. Wang	107
Simulation of the Residual Stress of Cold-Formed Thin-Wall Steel Members and Calculation of Load under Its Influence F. Zhao and H.C. Liu	112
Measurement of Stress Distribution Near Fatigue Crack in Ultra-Fine Grained Steel by Synchrotron Radiation Y. Akiniwa, K. Tanaka and H. Kimura	118
Approximate Analytical Formulae to Evaluate the Uncertainty in X-Ray Stress Analysis M. François, C. Ferreira and R. Guillén	124

Adaptation of the X-Ray Diffraction Technique to the Analysis of Residual Stress in Carbo-Nitrided Steel Layers J.M. Sprauel and H. Michaud	125
The Sensitivity of Focusing, Parallel Beam and Mixed Optics to Alignment Errors in XRD Residual Stress Measurements A.C. Vermeulen	131
X-Ray Stress Measurement Using Whole Back Diffraction Ring S.I. Ohya, K. Akita, Y. Shitaba and M. Yoshikawa	137
Non-Destructive Analysis of Surface Stresses Using Grazing Incident X-Ray Diffraction C. Braham, A. Baczmanski, W. Seiler and N. Shiraki	143
Stresses Evaluation by Transmission Energy Dispersive X-Ray Diffraction Using Industrial Radiography Equipment B. Lavelle, L. Vendier and O. Auriol	149
Surface Roughness Effect on Pseudo-GIXRD Stress Analysis J. Peng, V. Ji and W. Seiler	153
Inter and Intra Granular Strain Analysis by Microdiffraction Kossel S. Berveiller, P. Dubos, K. Inal, A. Eberhardt and E. Patoor	159
Residual Stress Mapping in Railway Rails J.F. Kelleher, D.J. Buttle, P.M. Mummery and P.J. Withers	165
Residual Stress Error Introduced by Truncated Patterns: Prediction and Correction C. Ferreira, M. François and R. Guillén	171
A New Type of Instrument with Its Special Excited Input-Signal in Inspecting Residual Stress G. Huang, L.M. Li, Y.P. Cao and X. Chen	177
Effects of Temperature Fluctuations on X-Ray Stress Determination M. François, C. Ferreira and R. Guillén	183
Ultrasonic Evaluation of Compressive Residual Stress of Surface Treated Metals F. Belahcene, X. Zhou and J. Lu	184
Determination of Volume Fraction of Constituents in Deformed Stainless Steel by Means of Image Plate T. Sasaki, Y. Kanematsu and Y. Hirose	190
Residual Stresses Measurement Using an Indentation Made by an Impact Load Q.H. Lin, H. Chen, J. Chen and Y. Liang	196
Measurement on X-Ray Stress Constant of Beryllium P. Dong and R. Li	202
Principle and Method of X-Ray Computer Tomography on Residual Stress Measurement Y. Chen, S. Zhou and Q. Ren	208
A New Method for Measuring Residual Stress Relaxation during Nanoindentation F. Wang and K.W. Xu	213
Residual Stress Measurements in Australia: Present and Future C. Curfs, O. Kirstein, A. Studer, R. Blevins, D.G. Carr and M.I. Ripley	218
Comparative Neutron and Synchrotron X-Ray Diffraction Studies to Determine Residual Stress on an As-Welded AA2024 Plate S. Ganguly, M.E. Fitzpatrick and L. Edwards	223
Neutron Stress Measurement Using Neutron Image Plate T. Sasaki, N. Minakawa, Y. Morii, N. Niimura and Y. Hirose	229
Suppression of Surface Effect by Using Bent-Perfect-Crystal Monochromator in Residual Strain Scanning M. Vrána and P. Mikula	234
Internal Stress Measurement of Fiber Reinforced Composite by Neutron Diffraction with In Situ Low Temperature Stress Measurement System N. Masayuki, M.R. Muslih, Y. Ikeuchi, N. Minakawa and H. Takao	239
Development of New Stress Measurement Method Using Neutron Diffraction H. Suzuki, N. Minakawa, A. Moriai, M. Hataya and Y. Morii	245
Neutron Determination of Residual Stress in a Nitrided Notched Part A. Fabre and L. Barrallier	251

Neutron Diffraction Study of Extruded Magnesium during Cyclic and Elevated Temperature Loading	
E.C. Oliver, M.R. Daymond and P.J. Withers	257
Neutron Diffraction Analysis of Residual Stresses Induced by Laser Shock Peening	
I. Chaieb, C. Braham, P. Peyre, E. Labbe and A. Lodini	263
Neutron Evaluation of Stress in Industrial Screws	
A. Fabre, I. Lillamand, J. Masse and L. Barrallier	269
In Situ Neutron Diffraction Studies of Phase Transformations in Si - Mn TRIP Steel	
O. Muránsky, P. Lukáš, P. Šittner, J. Zrník, P. Jenčuš and Z. Nový	275
X-Ray Stress Measurement of Carbide in Tool Steel	
M. Gotoh, H. Hirose and T. Sasaki	281
In Situ Synchrotron Measurements of Oxide Growth Strains	
J. Almer, G.A. Swift, J.A. Nychka, E. Üstündag and D.R. Clarke	287
Residual Stress Mapping in Welds Using the Contour Method	
Y. Zhang, S. Pratihari, M.E. Fitzpatrick and L. Edwards	294
The Vibratory Stress Relief of Drill Pipe	
Y.B. Zhang, S.W. Chen, C.J. Liu, Y.H. Sun, M.C. Sun and R.K. Wang	300
Effect of Machining Conditions on Residual Stress Corrosion Cracking of 316L SS	
C. Braham, A. Ben Rhouma, J. Lédion and H. Sidhom	305
Measurement and Analysis of Surface Residual Stress of Railroad Wheels with X-Ray Method	
H.R. Huang, Y.L. Zhang and Q.M. Wang	311
Effects of Stress Cycles on Surface Magnetic Field	
X. Chen, L.M. Li, E. Yang and X.F. Huang	317
Measurement and Analysis of Residue Stresses Conditions in High Pressure Gas Cylinder	
S. Ge, Y.L. Zhang and X.D. Xu	322
Alternative Mechanical Surface Treatments for Fatigue Strength Enhancement	
I. Altenberger	328
Residual Stresses Induced by Laser FreeForm Fabrication	
R.L. Peng, S.Å.H. Johansson, T. Ericsson and L. Thorsson	334
The Effect of Fatigue on Residual Peening Stresses in Aerospace Components	
A. King, A.D. Evans, P.J. Withers and C. Woodward	340
Influence of Grinding Conditions on Residual Stress Profiles after Induction Surface Hardening	
J. Grum	346
Residual Stresses Induced by Robotized Hammer-Peening	
D. Thibault, R. Simoneau, J. Lanteigne and J. Fihey	352
Residual Stresses due to Deep-Drawing of Pre-Coated Aluminum-Alloy Sheets	
M. Sudo, T. Iwase, Y. Hattori and M. Nakajima	358
Residual Stress in a Quenched Gear Shaft Treated by Water Cavitation Peening	
H. Tsuda, D.Y. Ju, T. Uchiyama, Y. Sunayama and R. Oba	364
Compressive Residual Stress Evolution Process by Laser Peening	
K. Akita, H. Tanaka, Y. Sano and S.I. Ohya	370
Residual Stress State and Cyclic Deformation Behaviour of Deep Rolled and Laser-Shock Peened AISI 304 Stainless Steel at Elevated Temperatures	
I. Nikitin, I. Altenberger and B. Scholtes	376
Approach of Residual Stress Generated by Deep Rolling Application to the Reinforcement of the Fatigue Resistance of Crankshafts	
F. Galzy, H. Michaud and J.M. Sprauel	384
An Investigation into Work Hardening of Shot Peening Affected Layer Using X-Ray Stress Analysis Technique	
J.B. Li, X.Y. Gai, D.L. Wang, S.Y. Ma and V. Ji	390
Calculation of Relaxation of Residual Stress and Change of Yield Strength in Shot Peened Layer	
Y.H. Li, J. Lu and K.W. Xu	396
Residual Stress Relaxation during Fatigue of Clinched Joints in Stainless Steels	
P. Sjöström and S.Å.H. Johansson	404

A Strategy for Life Prediction of Fatigue Loaded Welded Constructions by Use of Continuously Measured Micromagnetic Parameters T. Nitschke-Pagel	409
Effect of Very High Stress Levels on the Fatigue Life of a TiAl Based Alloy C. Pilé, D. Retraint, M. François and J. Lu	418
Depth Resolved Investigation of Friction Stir Welds Made from AA2024 / AA2024 and AA2024 / AA6082 Using a Spiral Slit and High Energy Synchrotron Radiation R.V. Martins and V. Honkimäki	424
A Study on Residual Stress Relaxation under Quasi-Static Load M. Qin, V. Ji, S.Y. Ma and J.B. Li	430
Residual Stress Relaxation and Cyclic Deformation Behavior of Deep Rolled AlMg4.5Mn (AA5083) at Elevated Temperatures P. Juijerm, I. Altenberger, U. Noster and B. Scholtes	436
Stability and Relaxation of Homogeneous Microstresses in Two-Phase Steels with Cyclic Loading I. Renner, H. Behnken, V. Hauk and P. Beiss	442
Influence of Shot Peening on Fatigue Properties in Ultra-High Strength Steels Y.K. Gao, X.R. Wu, F. Lu, M. Yao and Q. Yan	448
Effect of Applied and Residual Stresses on the Analysis of Mechanical Properties by Means of Instrumented Indentation Techniques J. Gibmeier, S. Hartmann and B. Scholtes	454
Residual Stress Profiles of the Laser Surface Remelted Nodular Irons J. Grum and R. Šturm	460
Non-Homogenous Precipitation Annealing of Maraging Steels J. Grum and M. Zupančič	469
Relieving Welding Residual Stress by Applying Vibratory Weld Conditioning Z.Q. Zhu, L.G. Chen and D.L. Rao	475
Analysis of Residual Stress Influencing on Safety of Steam Turbine C. Ding, S.F. Tian, K. Wan and L. Sun	481
Determination of Residual Stress Gradients in Al₂O₃ Ceramics after Thermal and Mechanical Loading T. Erbacher, M. Ott, T. Beck and O. Vöhringer	485
Analysis of Residual Stresses and Distortions in Brazed Joints of Cemented Carbide and Steel A. Ottlik, V. Schulze, L. Pintschovius, H. Müller and D. Löhe	491
Dendritic Stresses in Nickel-Base Superalloys U. Brückner, A. Epishin, T. Link, B. Fedelich and P.D. Portella	497
Analysis of Residual Stresses in Micro Powder Injection Moulded Micro Bending Specimens Made of Zirconia B. Kasanická, T. Wroblewski, V. Schulze and D. Löhe	503
Modification of Alumina Ceramics Properties by Stressonic® Shot Peening H. Tomaszewski, K. Godwod, R. Diduszko, F. Carrois and J.M. Duchazeaubeneix	509
Residual Stresses in Bulk Metallic Glasses due to Thermal Tempering C.C. Aydinler and E. Üstündag	515
Residual Stresses and Strength of Shot Peened Silicon Nitride Ceramics W. Pfeiffer and T. Frey	521
Synchrotron Evaluation of Residual Stress in a Leucite Reinforced Glass Ceramic A. Carradò and L. Barrallier	527
Determination of the Residual Stresses in Composite Laminate Using the Compliance Method G. Montay, O. Sicot, X.L. Gong, A. Cherouat and J. Lu	533
The Connection between Micro-Residual Stress and Thermo-Mechanical Treatments in 6061Al-15vol%SiC_w Composites G. Bruno, R. Fernández and G. González-Doncel	539
Depth Profile of Titanium Alloy (Ti-6Al-4V) and Residual Stress Measured by Using X-Ray Diffraction after Metal Cutting Assisted by High-Pressured Jet Cooling Evaluation of Etching Methods: ION Beam (EDOS) and Electro-Chemical Etching M. Vosough, P. Liu and I. Svenningsson	545

An Investigation of Residual Stress of Porous Titania Layer by Micro-Arc Oxidation under Different Voltages	
P. Huang, K.W. Xu, B.B. He and Y. Han	552
Effect of Thermal Mismatch Stress on Thermal Expansion Behaviors of $\text{Al}_{18}\text{B}_4\text{O}_{33}\text{w/Al}$ Composite Containing Fe_3O_4 Particle	
G. Li and W.D. Fei	558
Internal Stress Effects on Mechanical Properties of TiCp Particle Reinforced Titanium Composites	
X.N. Mao, V. Ji, L. Zhou, Y.G. Zhou, P.S. Zhang and L.L. Yu	564
Measurements of the Residual Stresses due to Cement Polymerization for Cemented Hip Implants	
N. Nuño and D. Plamondon	571
In Situ Observation of Thermal Stress in Nano-Size Thin Aluminum Films	
H. Takao, K. Kusaka, S. Shingubara and O. Sakata	577
Residual Stress Effects on Raman Spectra of RuO_2 Thin Films	
L. Meng, R.A. Silva, H.N. Cui, V. Teixeira and M.P. dos Santos	583
Microstresses in Molybdenum Nitride Thin Films Deposited by Reactive DC Magnetron Sputtering	
Y.G. Shen	589
Investigation of the Relationship between Annealing Temperature and Yield Strength in Cu Film by In Situ XRD Stress Analysis Method	
M. Qin, V. Ji, Y.N. Wu, S.Y. Ma and J.B. Li	595
Influence of Interfacial Neighborhood on Residual Stress due to Deposition of TiN Thin Films Made by PVD	
H. Hirose, S. Suzuki, M. Gotoh and T. Sasaki	601
Residual Stress Analysis of Thermal Sprayed Molybdenum Deposit	
L. Li, A. Vaidya, T. Streibl, S. Sampath, A. Gouldstone, V. Luzin and H. Prask	607
Effect of Substrate Temperature on Crystal Orientation and Residual Stress in RF Sputtered Gallium Nitride Films	
K. Kusaka, H. Takao, K. Tominaga and N. Yamauchi	613
Residual Stress and Wear Characteristics of Ni_3Al Coating Layer	
T. Murotani, Z. Wang, A. Ikenaga and Y. Hirose	619
Generation of Nanostructures on 316L Stainless Steel and Its Effect on Mechanical Behavior	
T. Roland, D. Retraint, K. Lu and J. Lu	625
Spalling Stress in Oxidized Thermal Barrier Coatings Evaluated by X-Ray Diffraction Method	
K. Suzuki and K. Tanaka	631
Evaluation of Residual Stress in Nano-TiO_2 Film on ITO Glass by Synchrotron X-Ray Diffraction	
D.Y. Ju, T. Ueda, T. Hatakeyama, T. Arizono, K. Kusaka and H. Takao	637
Residual Stress Analysis in Both As-Deposited and Annealed CrN Coatings	
R.L. Peng, Y.D. Wang, M. Odén and J. Almer	643
Sensitivity of a Rotating Beam Sensor for Stress Evaluation in Aluminium Thin Films	
J.M.M. dos Santos, J.C.P. Pina, A.C. Batista, A.B. Horsfall, K. Wang, N.G. Wright, S.M. Soare, S.J. Bull, A.G. O'Neill, J.G. Terry, A.J. Walton, A.M. Gundlach and J.T.M. Stevenson	649
Delamination and Buckling Induced by Compressive Strain in Metal Thin Films	
Y.G. Shen	655
Residual Stress Measurement in Sputtered Copper Thin Films by Synchrotron Radiation and Ordinary X-Rays	
M. Hataya, H. Takao, K. Kusaka, K. Tominaga, T. Matsue and O. Sakata	661
Testing and Analysis of the Inner Stress in Adhesive Coating Layer Using Strain Gauges and Finite Element Method	
X.L. Zheng, M. You, Y. Zheng, H.Z. Yu and C.M. Yang	667
Application of the White/Monochromatic X-Ray μ-Diffraction Technique to the Study of Texture and Triaxial Strain at the Submicron Level	
P. Goudeau, N. Tamura, R. Spolenak and H.A. Padmore	672
X-Ray Measurements of Residual Stress Distribution in TiN Thin Films with Fiber Texture	
K. Tanaka, Y. Akiniwa, M. Kawai and T. Ito	678

XRD Stress Analysis in a TiAl Based Intermetallic Multicrystal W. Seiler, G. Hoël, M. Thomas and V. Ji	684
Determination of Residual Stresses after Tensile Tests and Deep Drawing of Unstable Austenitic Steel M.R. Berrahmoune, S. Berveiller, K. Inal, E. Patoor, C.R. Simon and J. Glez	690
A Study on the Microstrains in the Textured $\text{YBa}_2\text{Cu}_3\text{O}_{7-d}$ Superconductor Films D.M. Liu, M. Liu, W.Q. Xiao, X.D. Xu, W. Liu and M.L. Zhou	696