

Table of Contents

Preface

A Method for the Analysis of the Growth of Short Fatigue Cracks	3
A.J. McEvily	
Studies of SCC and Hydrogen Embrittlement of High Strength Alloys Using Fracture Mechanics Methods	11
W. Dietzel, M. Pfuff and G.G. Juilfs	
A Model for Crack-Induced Nucleation of Dislocations, Complex Stacking Faults and Twins	17
G.E. Beltz, M. Chang and A. Machová	
Ideal Strength of Nano-Components	25
T. Kitamura, Y. Umeno and A. Kushima	
Theoretical Strength of Metals and Intermetallics from First Principles	33
M. Šob, J. Pokluda, M. Černý, P. Šandera and V. Vitek	
Nanoscale Measurement of Stress and Strain by Quantitative High-Resolution Electron Microscopy	39
M.J. Hýtch, J. Putaux and J. Pénisson	
Atomic Force Microscopy Study of the Early Fatigue Damage	45
J. Polák, J. Man and K. Obrtlik	
Mechanical Response of Semi-Brittle Nano Particles under an Imposed Cyclic Field	51
Y. Katz, W. Mook, R. Mukherjee, A. Gidwani, J. Deneen and W.W. Gerberich	
Prediction and Control of Grain Boundary Fracture in Brittle Materials on the Basis of the Strongest-Link Theory	55
T. Watanabe and S. Tsurekawa	
Anisotropic Behaviour of Grain Boundaries	63
V. Paidar and P. Lejček	
Plasticity of Copper with Small Grain Size	71
Y. Champion, C. Langlois, S. Guérin, S. Lartigue-Korinek, P. Langlois and M.J. Hýtch	
Mechanical Behavior of Nanostructured Aluminum Alloys Containing Quasicrystalline Phase	77
Y.V. Milman	
Effect of Processing Route on Microstructure and Mechanical Behaviour of Ultrafine Grained Metals Processed by Severe Plastic Deformation	83
V. Sklenička, J. Dvořák, M. Svoboda, P. Král and B. Vlach	
Cause and Effect of Factors Affecting the ΔK_{th} of Small Crack	89
Y. Kondo	
The Significance of Plastic Zone Growth under Cyclic Loading and Crack Opening/Closing Model in Fatigue Crack Propagation	95
M. Toyosada and K. Gotoh	
Microstructural Characterization by Nondestructive Methods	103
P. Lukáč, Z. Trojanová and F. Chmelík	
Critical Planes in Multiaxial Fatigue	109
A. Karolczuk and E. Macha	
Fracture Behaviour of Brittle (Glass) Matrix Composites	115
I. Dlouhý, Z. Chlup and A.R. Boccaccini	
Breakdown of the Schmid Law in BCC Molybdenum Related to the Effect of Shear Stress Perpendicular to the Slip Direction	123
R. Gröger and V. Vitek	
Criterion of Mechanical Instability in Inhomogeneous Atomic System	127
Y. Umeno and T. Kitamura	
Ductile-Brittle Behavior of Microcracks in 3D	131
V. Pelikán, P. Hora, A. Machová and M. Landa	
Elasticity and Stability of Fe-P Ordered Systems from First Principles	135
M. Černý and J. Pokluda	

Ab-Initio Study of Mechanical Properties of Transition-Metal Aluminides: A Case Study for Al₃(V,Ti)	139
M. Jahnátek, M. Krajčí and J. Hafner	
Locally Initiated Elastic Waves in 2D Metals	143
G.M. Poletaev, M.S. Aksenov, M.D. Starostenkov and J.V. Patzeva	
Effect of Ordering on the Elastic Parameters of Multicomponent Ni-Based Systems	147
J. Buršík	
Near-Field Study of Carrier Dynamics in InAs/GaAs Quantum Dots Grown on InGaAs Layers	151
P. Tománek, P. Dobis, M. Benešová and L. Grmela	
Disorientations and Their Role on the Work-Hardening in Stage IV	155
W. Pantleon	
Stability and Motion of Low Angle Dislocation Boundaries in Precipitation Hardened Crystals	159
D. Holec and A. Dlouhý	
A Three Dimensional Discrete Dislocation Dynamics Analysis of Cyclic Straining in 316L Stainless Steel	163
C. Déprés, C.F. Robertson, M. Fivel and S. Degallaix	
The Migration of Solute Atoms in the Stress Field of a Slowly Moving Crack	167
P. Streitenberger	
Modelling Cleavage Fracture in High Strength Steels and Their Welds	171
R. Rodriguez, I. Ocaña-Arizcorreta and A. Martín-Meizoso	
Micromechanisms of Cleavage Fracture in HAZ of Low Carbon Steel Welds	175
C. Moya-Gutiérrez, I. Ocaña-Arizcorreta and A. Martín-Meizoso	
Dislocation Structures of Duplex Stainless Steel in Uniaxial and Biaxial Cyclic Loading	179
M. Petrenec, V. Aubin, J. Polák and S. Degallaix	
Microstructure and Thermal Stability of Ultra Fine Grained Mg and Mg-Gd Alloys Prepared by High-Pressure Torsion	183
J. Čížek, I. Procházka, B. Smola, I. Stulíková, R. Kužel, Z. Matěj, V. Cherkaska, R.K. Islamgaliev and O.B. Kulyasova	
Annealing Behaviour of Fe-C-N Nanopowder: Formation of Iron/Graphite Core-Shell Structured Nanoparticles	187
B. David, N. Pizúrová, O. Schneeweiss, P. Bezdička, J. Filip, R. Alexandrescu, I. Morjan, A. Crunteanu and I. Voicu	
Effect of Grain Boundary Segregation on Mechanical Properties of P-Doped Fe-Si Base Alloys	191
J. Janovec, M. Jenko, J. Pokluda, B. Vlach, P. Lejček, M. Svoboda and P. Šandera	
Influence of Lattice Anisotropy on Models Formulated by Cellular Automata in Presence of Grain Boundary Movement: A Case Study	195
J. Kroc	
Migration of the 45°[100],(001)/(011) Asymmetrical Tilt Grain Boundary in an Fe–6at%Si Alloy	199
V. Havlová and P. Lejček	
Study of Carbon Films on Silicon Substrates	203
O. Jašek, M. Eliáš, Z. Frgala, J. Matějková, A. Rek and M. Kadlecíková	
Positron Annihilation Studies of Microstructure of Ultra Fine Grained Metals Prepared by Severe Plastic Deformation	207
J. Čížek, I. Procházka, B. Smola, I. Stulíková, R. Kužel, M. Cieslar, Z. Matěj, V. Cherkaska, G. Brauer, W. Anwand, R.K. Islamgaliev and O.B. Kulyasova	
Experimental Investigation of the Local Deformation Behaviour of MMCs	211
K. Unterweger and O. Kolednik	
Local and Global Fracture Properties in Metal Matrix Composites	215
I. Sabirov and O. Kolednik	
Phase Composition and Microstructure Stability of Al-Ni-Zr Alloys	219
B. Bártová, J. Verner, D. Vojtech, A. Gemperle and M. Černanský	
Interaction of a Crack in the Plasma-Sprayed Ceramic Coating with the Metal Substrate	223
L. Náhlík, Z. Knésl and F. Kroupa	

3D Visualisation of Short Crack Propagation in Al Alloy Using High Resolution Synchrotron X-Ray Microtomography	227
E. Ferrié, J.Y. Buffière and W. Ludwig	
Identification and Modelling of the Behaviour of a Duplex Stainless Steel by Methods of Scale Changing	231
S. Degallaix, F. Jaupitre, D. Kondo, P. Quaegebeur and P. Forget	
Influence of Material State at a Crack Tip on the Process of Fatigue Striations Formation for Al-Based Alloys	235
A.A. Shaniavski	
Grain Size Estimation in Anisotropic Materials	239
I. Saxl, P. Ponížil and K. Sülleiová	
Application of Silicon for a Protection of Titanium against High-Temperature Oxidation	243
D. Vojtech, T. Kubatík and H. Čížová	
Biocompatibility of Carbon Layer on Polymer	247
O. Kubová, L. Bačáková and V. Švorčík	
Biocompatibility of Polyethylene Doped with Oxycellulose	251
R. Mikulíková, K. Kolářová, L. Bačáková and V. Švorčík	
Strain Heterogeneity and Damage Localization in Nodular Cast Iron Microstructures	255
G. Nicoletto, L. Collini, R. Konečná and P. Bujnová	
Textural Fractography of Fatigue Failures under Variable Cycle Loading	259
H. Lauschmann, F. Siška and I. Nedbal	
Analysis of Fracture Morphology and Local Loading Modes in Torsional Fatigue	263
K. Slámečka and J. Pokluda	
Effect of Structure on Creep Behaviour of Superalloy Single Crystals	267
P. Lukáš, L. Kunz, M. Svoboda and J. Čadek	
Microstructural Development in Tension and Compression Creep of Magnesium Alloy AE42	271
H. Dieringa, A.L. Bowles, N. Hort and K.U. Kainer	
Microstructure and Creep Properties of AISI 316LN Steels with Niobium Additions	275
V. Vodárek, G. Rožnovská and J. Sobotka	
Effect of Processing Parameters on Microstructure and Properties of Continuously Cast Al-Mg Sheets	279
M. Slámová, P. Sláma, P. Homola and M. Karlík	
Effects of Hydrogen Environment on Fatigue Characteristics of 18Cr-8Ni Stainless Steel	283
K. Kawamoto, Y. Aoki, Y. Oda, T. Yoshimura, H. Noguchi and K. Higashida	
Damage Mechanisms and Rupture Criterion of PM Ti-6Al-4V at 20K	287
S. Di Iorio, L. Briottet, E.F. Rauch and D. Guichard	
Dip-Test Internal Stress and the Composite Model of Creep Deformation	291
F. Dobeš and A. Orlová	
The Formation and Destruction of the Boundary Layer in Polymer Composite Fiber Shells during Their Ageing	295
S.P. Senchurov and Y.F. Zabashta	
On Crack Path in Fibres-Reinforced Ceramic Composites	299
T. Profant and M. Kotoul	
The Role of the Constraint in the Case of Short Cracks	303
P. Hutař, S. Seitl and Z. Kněsl	
Critical Strain Energy Density along the Curved Front of the Growing Fatigue Crack	307
T. Denk, V. Oliva and A. Materna	
On the Crack Tip Shielding in Particle Reinforced Composites	311
J. Horníková, P. Šandera and J. Pokluda	
Identification and Simulation of Elastic-Plastic Deformation Model	315
Ł. Maciejewski, W. Myszka and G. Ziętek	
New Description of Steady-State Creep Rate, Yield Stress, Stress Relaxation and Their Interrelation	319
J. Kohout	
Computational Modelling of Spherical Cavity Behaviour in Rubber-Like Solids	323
P. Skacel and J. Bursa	

Tangent Moduli of the Hencky Material Model Derived from the Stored Energy Function at Finite Strains	
A. Kruisová and J. Plešek	327
Modelling of the Charpy Impact Test in the DBTT Range	
P. Haušild, C. Berdin and A. Rossoll	331
Parameters Identification for GTN Model and Their Verification on 42CrMo4 Steel	
V. Kozák and L. Vlček	335
A Fracture Mechanics Investigation on Crack Growth in Massive Forming	
G. Trattnig, C. Sommitsch and R. Pippan	339
Finite Element Computational Technology in Resonant Ultrasound Spectroscopy of Composite Materials	
R. Kolman, J. Plešek and M. Landa	343
Compatibilizer Effect of Grafted Glycidyl Methacrylate on EPDM/Organoclay Nanocomposites	
K.G. Gatos, A.A. Apostolov and J. Karger-Kocsis	347
Elastic Properties of Structural Phases in Shape Memory Alloys Investigated by Resonant Ultrasound Spectroscopy	
M. Landa, V. Novák, P. Sedláček, L. Mañosa and P. Šittner	351
Effect of Interfaces on Fiber Fracture in Mg and MgLi Matrix Composites	
S. Kúdela, H. Wendrock, L. Ptáček, S. Menzel and K. Wetzig	355
Influence of Inclusions on Fatigue Characteristics of Non-Combustible Mg Alloy	
Y. Kitahara, H. Shimazaki, T. Yabu, H. Noguchi, M. Sakamoto and H. Ueno	359
Mechanical Properties of AS21 Magnesium Alloy Based Composites	
Z. Trojanová and Z. Száraz	363
Investigation of Dynamic Strain Ageing Effects of Low Alloy Steels 15Kh2MFA and 15Kh2NMFA	
M. Ernestová	367
Influence of Isothermal Transformation Dwell on Tensile and Fatigue Properties of Austempered Ductile Iron	
S. Věchet, J. Kohout and K. Hanzlíková	371
Influence of Temperature on Fracture Mechanisms of Magnesium Composites	
V. Gärtnerová, M. Chalupová, A. Jäger and Z. Trojanová	375
Influence of Surface Skin on the Fatigue Properties of Die-Cast Magnesium Alloy AS21X	
T.T. Lamark, M. Janeček and Y. Estrin	379
Crack Growth Anomalies in Base Steel P91 and in HAZ	
J. Balík, M. Janeček and J. Pešička	383
Damping Measurements of the Magnesium Wrought Alloys AZ31, AZ61 and AZ80 after Indirect and Hydrostatic Extrusion	
J. Göken, J. Swiostek, D. Letzig and K.U. Kainer	387
Electrical Properties of Polymer Composites	
T. Podgrabski, P. Slepčka, V. Rybka and V. Švorčík	391
Application of Giant Magnetostrictive Material into Construction of Broad Spectrum Vibration Generator	
J. Bomba, J. Kaleta and P. Sawa	395
On a Testing of Mechanical Properties of Material Surfaces	
L. Berka and N.V. Murafa	399
Experimental Identification of Magnetorheological Composites and Elastomers Properties	
J. Kaleta, D. Lewandowski and P. Zająć	403
Relation between Uniaxial and Equi-Biaxial Creep and Creep Fracture Behaviour in P91 Steel	
K. Milička and F. Dobeš	407