

Table of Contents

Preface, Committees

Chapter 1: Fracture, Damage and Behavior Assessment of Structural Materials

Influence of Environment, Residual Stresses on the Fatigue Behavior of 7075-T6 Aluminum Alloy

S. Baragetti, N. Srinivasan, B. Lalithkumar and R. Kumar 3

Investigating the Degradation Phenomena of Teflon Exposed to Acidic Environment

G. Zattini and L. Mazzocchetti 7

Influence of Cr and Mn Addition and Heat Treatment on the Corrosion Behaviour of an AlSi3Mg Alloy

M. Tocci, L. Montesano, A. Pola, M. Gelfi and G.M. La Vecchia 11

SEM Study of Fatigue Crack Propagation in Chromium Martensitic Steel after LCF

T. Eterashvili, G. Abuladze, L. Kotiashvili, T. Dzigrashvili and M. Vardosanidze 15

Effects of PVD DLC Coating on 7075-T6 Alloy Fatigue Strength

S. Baragetti 19

Influence of Agitation Equipment on Reinforcing Effect and Dispersion State of Cellulose Nano-Fibers in Natural Rubber

S. Omori, T. Morita, K. Matsumoto, A. Nagatani and T. Tanaka 23

Fatigue Crack Initiation in Nickel-Based Superalloy MAR-M247 at High Temperature

I. Šulák and K. Obrtlik 27

Degradation of the Strength of Grains and Grain Boundaries of Ni-Base Superalloy under Creep and Creep-Fatigue Loadings

T. Murakoshi, H. Sakamoto, T. Shinozaki, K. Suzuki and H. Miura 31

Static Multiaxial Fracture Behavior of Graphite Components: A Review of Recent Results

S.M.J. Razavi, M. Peron, J. Torgersen and F. Berto 35

Influence of Texture and Environmental Effects on Fatigue Behavior of Ti-6Al-4V Alloy

S. Baragetti, N. Srinivasan and R. Kumar 39

Fatigue Crack Growth in an Al-Mg-Si Alloy under Negative Load Ratio

M.A.S. Torres, B.R.L. Silva, D.H.S. Costa, C.A.R.P. Baptista and V. Pastoukhov 43

Creep Damage Tolerance Factor λ of Selected Creep-Resistant Steels

V. Sklenička, K. Kuchařová, J. Dvořák, M. Kvapilová and P. Král 47

Benefits and Risks in the Use of Composite Materials in Solar Vehicles

S. Maglio, F. Vannucchi de Camargo and M.R. Rodrigues 51

Deterioration Behaviors of Overlapping Layers between Al-5Mg Alloy Thermal Spray Coating and Heavy-Duty Paint Coating

S. Kainuma, J.X. Du, M.Y. Yang, K. Muto and H. Miyata 55

Fracture Evaluation of the Falling Weight Impact Behaviour of a Basalt/Vinylester Composite Plate through a Multiphase Finite Element Model

F. Vannucchi de Camargo and A. Pavlovic 59

Growth and Interaction of Debonds in Local Clusters of Fibers in Unidirectional Composites during Transverse Loading

J. Varna, L.Q. Zhuang, A. Pupurs and Z. Ayadi 63

The Strange Case of Compacted Graphite Iron: A Remarkable Option with Unique Material Properties or an Unusable Alloy?

S. Mitrovic, E. Savini and D. Dzunic 67

Fracture Toughness Characterization of Carbon Bonded Alumina Using Chevron Notched Specimens

H. Zielke, M. Abendroth and M. Kuna 71

Experimental Study of Fatigue Crack Initiation and Strain Evolution around a Micro-Void by *In Situ* SEM and Digital Image Correlation

D.Q. Wang, M. Zhu and F.Z. Xuan 75

Experimental Characterization of Competition of Surface and Internal Damage in Very High Cycle Fatigue Regime W.C. Zhang, M. Zhu and F.Z. Xuan	79
Influence of the Crack Widening on the Transverse Cracking in Lamellar Metal-Ceramic Composites R. Piat, M. Kashtalyan and I. Guz	83
Buckling and Post-Buckling Behaviour of Impacted Glass Reinforced Composite Plates under Compression after Impact Tests R. Cristiano and G. Perillo	87
The Evaluation of Deformation and Fracture of Gilsocarbon Graphite Subject to Service Environments: Experimental and Modelling B. Šavija, G.E. Smith, P.J. Heard, E. Sarakinou, J.E. Darnbrough, K.R. Hallam, E. Schlangen and P.E.J. Flewitt	91
Effect of Shrinkage Porosity and Degenerated Graphite on Fatigue Crack Initiation in Ductile Cast Iron E. Foglio, M. Gelfi, A. Pola and D. Lusuardi	95
Fracture-Mechanics Behaviour of Ceramic Foam with Macroscopic Stress Concentrator upon the Tensile Test O. Ševeček, Z. Majer, L. Bertolla, Z. Chlup and M. Kotoul	99
3D Model of Crack Propagation in Particulate Ceramic Composite Containing Residual Stresses K. Štegnerová, Z. Majer, P. Hutař and L. Náhlík	103
Lifetime Assessment of Particulate Ceramic Composite with Residual Stresses L. Náhlík, Z. Majer, K. Štegnerová and P. Hutař	107
On the Tensile Behaviour of CF and CFRP Materials under High Strain Rates A. de Luca, F. di Caprio, E. Milella, G. Lamanna, M. Ignarra and F. Caputo	111
Experimental Investigation of Failure Modes for Sandwich Beams L. Maravina, D.A. Șerban, C. Pop and R. Negru	115
Analysis of the Three-Dimensional Zone around the Interfacial Crack Tip: The <i>K</i>-Influence Domain Range in the Plane Stress State J.M. Djoković, S.D. Vulović, R.R. Nikolić, M.M. Živković and B. Hadzima	119
Analysis of Residual Stress around Semi-Circular Surface Notches due to Excessive Pressure T. Ino, Y. Sonobe, A. Saimoto and T. Hashiguchi	123
Using Numerical Simulation in the Optimization of the Finishing Phases in Ceramic Tiles Manufacturing A. Radovanovic, M. Mladenovic, G. Campana and M. Mele	127
Hydrogen-Assisted Micro-Damage in Cold-Drawn Pearlitic Steels: Resembling Donatello Wooden Sculpture Texture J. Toribio	131
Fiber Orientation Control by Stretching in Cellulose Nanofiber Green Composites H. Takagi, A.N. Nakagaito and Y. Sakaguchi	135
Chapter 2: Computational Mechanics in Fracture and Damage Assessment of Materials and Structures	
Prediction of Fatigue Crack Path Based upon Green's Function Theory K. Yoshida and M. Arai	141
Numerical Analysis for Cracked Functionally Graded Materials by Finite Block Method J. Li, C. Shi and P.H. Wen	145
Analysis of Cracks in Functionally Graded Piezoelectric Materials by a Frequency-Domain BEM M. Wünsche, J. Sladek, V. Sladek, C. Zhang and M. Repka	149
A Phase Field Approach to Fracture with Mass Transport Extension for the Simulation of Environmentally-Assisted Cracking R. Falkenberg	153
On the Contact Stresses at the Indenting Edge of a Shaft-Hub Interference Fit Subject to Bending and Shear Forces E. Bertocchi, S. Mantovani and A. Strozzi	157

Analysis of Planar Crack Coalescence by Mesh-Free Body Force Method Y. Sonobe, T. Ino, A. Saimoto, M.A. Hasib, A. Koyama and G. Shatil	161
Fracture Mechanics Analysis of Size-Dependent Piezoelectric Solids under a Thermal Load J. Sladek, V. Sladek, M. Wünsche and C.L. Tan	165
The Frame Structure Analysis of the Structure with Repaired Part M. Arai	169
A Continuum Damage Model for Functionalized Graphene Membranes Based on Atomistic Simulations I. Benedetti, R.A. Soler-Crespo, A. Pedivellano, W. Gao and H.D. Espinosa	173
A Novel Micro-Mechanical Model for Polycrystalline Inter-Granular and Trans-Granular Fracture V. Gulizzi, C.H. Rycroft and I. Benedetti	177
Lightning Strike Simulation in Composite Structures J.F. de Toro Espejel and Z. Sharif Khodaei	181
Applicability of the Critical Energy Release Rate for Predicting the Growth of a Crack in Nanoscale Materials Applying the Strain Gradient Elasticity Theory M. Kotoul and P. Skalka	185
Bone Remodeling Algorithm Incorporating Various Quantities as Mechanical Stimulus and Assuming Initial Microcrack in Bone L. Borák and P. Marcián	189
A Numerical Model for the Simulation of Fatigue Induced Damage Onset and Evolution A. Riccio, F. Esposito and A. Sellitto	194
Numerical Modelling of a Chevron Notched Bend Specimen - Plane Model J. Sobek, S. González Menéndez and S. Seitl	198
On the Modelling of Creep Fracture and Fatigue P. Kauppila, R. Kouhia, J. Öjanperä, T. Saksala and T. Sorjonen	202
Application of the Williams Expansion near a Bi-Material Interface L. Malíková and S. Seitl	206
The Influence of Prefabricated Crack with Bias Angle on the Material's Fracture Toughness G.P. Zou, C. Zhao and Z.L. Chang	210
Shear Mode Stress Intensity Factors for Serrated Crack Fronts S. Žák, J. Horníková and P. Šandera	214
Numerical Computation of Stress Intensity Factors in Ultrasonic Very-High-Cycle Fatigue Tests S.H. Hasani Najafabadi, S. Zucca, D.S. Paolino, G. Chiandussi and M. Rossetto	218
Prediction of Elastic Properties of 3D4d Braided Composite Based on Hybrid Model D. Zhang, X.T. Zheng and T.C. Wu	222
On the Scale-Transition in Multiscale Modeling of Ductile Damage T. Lesičar, J. Sorić and Z. Tonković	226
A Grain-Scale Model of Inter-Granular Stress Corrosion Cracking in Polycrystals I. Benedetti, V. Gulizzi and A. Milazzo	230

Chapter 3: Assessment of Mechanical Properties of Various Joints

A Finite Element Based Analysis of Double Strap Bonded Joints with CFRP and Aluminium H. Biscaya, J. Cardoso and C. Chastre	237
A Study on the Fatigue Behavior of Hot Dip Galvanized Steel Connections S.M.J. Razavi, M. Peron, F. Mutignani, J. Torgersen and F. Berto	241
Fatigue Strength of Hot-Dip Galvanized Welded Steel Connections S.M.J. Razavi, M. Peron, F. Mutignani, J. Torgersen and F. Berto	244
Fracture Resistance of Flash Welded and Laser Welded Butt Joints in a Microalloyed HSLA Steel C.A.R.P. Baptista, H.V. Ribeiro, M.S.F. Lima, M.A.S. Torres and D.H.S. Costa	248
Experimental Investigation of Metallic Fiber-Reinforced Adhesively Bonded Joints under Bending S.M.J. Razavi and F. Berto	252

The Effect of Interface Geometry on the Mechanical Behavior of Adhesive Joints	256
S.M.J. Razavi, M. Peron, J. Torgersen and F. Berto	
Effect of Surface Morphologies of Interface on Adhesion Strength in a Metal/Epoxy Joint	260
Y. Yamazaki and T. Mizuno	
Effect of Temperature on Fatigue Strength Characteristic and Fatigue Mechanism in Laser Welded Dissimilar Stainless Steels Joint	264
Y. Miyashita, H. Iraha, Y. Narita and Y. Iizawa	
Evaluation of Residual Stresses in Butt Welded Joint of Dissimilar Material by FEM	268
R. Sepe, M. Laiso, A. de Luca and F. Caputo	
Mechanical Analysis of a Hexagonal Joint	272
S. Mantovani	

Chapter 4: Life and Fatigue Assessment of Parts and Structures

Influence of Manufacturing Defects on the Mechanical Behaviour of All-Composite Wing under Service Load Conditions	279
A. Riccio, A. Russo, A. Sellitto, G. Pezone, J. San Millan and I. Armendariz	
Runway Debris Impact on Aircraft Composite Parts	283
M. Buonsanti, F. Ceravolo and G. Leonardi	
Copper Mold for Continuous Casting of Steel: Modelling Strategies to Assess Thermal Distortion and Durability	287
L. Moro, J. Srnec Novak, D. Benasciutti and F. de Bona	
Optimization Methodology for an Automotive Cross-Member in Composite Material	291
I. Lo Presti, L. Cavazzoni, F. Calacci and S. Mantovani	
Measuring Deformations in a Rigid-Hulled Inflatable Boat	295
C. Fragassa and G. Minak	
Bending Fatigue Analysis of PM Gears	299
S. Glodež and M. Šori	
Structural Analysis for Estimating Damage Behavior of Double Hull under Ice-Grounding Scenario Models	303
A.R. Prabowo, J.M. Sohn, J.H. Byeon, D.M. Bae, A.F. Zakki and B. Cao	

Chapter 5: Assessment of Fracture and Damage of Building Materials and Structures

Damage-Involved Structural Pounding in Bridges under Seismic Excitation	309
R. Jankowski	
Modelling of Closed Steel Supports for Underground and Mining Works	313
P. Janas, K. Janas, L. Koubova and M. Krejsa	
Statistical Size Effects on Compressive Strength and Mechanical Behavior of Concrete	317
C.C. Vu, J. Weiss, O. Plé and D. Amitrano	
Investigation on the Unconfined Compression Strength of Rocks by Experimental Tests and Advanced Numerical Modelling Technique	321
A. Mardalizad, A. Manes and M. Giglio	
Performance of Anchors in Concrete Controlled by Splitting Failure under Dynamic Push-In Loadings	325
A.A. Nassr and W. Khair-Eldeen	
Modelling of Modified Compact Tension Test of Fine-Grained Cement-Based Concrete Specimens Using FEM Software	329
J. Klon, J. Sobek and Z. Keršner	
Punching Shear Design Method of Voided Slabs	333
J.H. Chung, H.K. Choi, C.S. Choi and H.S. Jung	
Structural Performance of Exterior Beam-Column Joints with Large Diameter Headed Bars	337
H.S. Jung, H.K. Choi, C.S. Choi and J.H. Chung	
New Insights into the Anchorage Zones of Precast Pretensioned Concrete Girders	341
K. van Meirvenne, W. de Corte, V. Boel and L. Taerwe	

Discrete Modeling of Strain Rate Effect in Concrete Fracture J. Květoň and J. Eliáš	345
Assessment of the Structural Condition of a Hospital-Type Building in Mexico City Damaged in the 1985 Earthquake J.A. Avila and J.A. Avila-Haro	349
Comparison of Calibration Functions for Short Edge Cracks under Selected Loads S. Seitl, P. Miarka, L. Malíková and M. Krejsa	353

Chapter 6: Techniques of Measurements and Monitoring

Smart Patch Repair with Low Profile PVDF Sensors F. Lambinet and Z. Sharif Khodaei	359
Dual Boundary Element Model of 3D Piezoelectric Smart Structures F. Zou, I. Benedetti and M.H. Aliabadi	363
Damage Detection in Composite Skin Stiffener with Hybrid PZT-FO SHM System F. Lambinet and Z. Sharif Khodaei	367
Degradation State Assessment of Rolling Bearing Based on Variational Mode Decomposition and Energy Distribution T. Han, D.X. Jiang and W.G. Yang	371
Laser Vibrometer Imaging of Delamination Interaction with Lamb Waves Using a Chirp Excitation Method I. Dafydd and Z. Sharif Khodaei	375
Delamination Identification in Stiffened Composite Panels Using Surface Strain Data G. Lampeas, C. Katsikeros and K. Fotopoulos	379
Measurement of Weld Mechanical Properties Using an Instrumented Indentation Technique K.N. Song	383
Damage Detectability Model of Pitch-Catch Configuration in Composite Plates N. Yue, Z. Sharif Khodaei and M.H. Aliabadi	387
Residual Stress Measurement in Innovative Friction Stir Welding Processes D. Campanella, C. Casavola, A. Cazzato, L. Fratini, V. Moramarco and C. Pappalettere	391