Table of Contents

Preface and Committees

Plenary Lectures

What Happens beyond Drucker's Proposition in Heterogeneous Media Y.L. Bai, G.W. Ma, S.W. Hao, M.F. Xia and F.J. Ke	3
Dynamic Compression of Buffer Plates Impact by a High Velocity Sand Spray V. Deshpande and T. Liu	8
Homogenized Elastic-Viscoplastic Behavior of Anisotropic Open-Porous Bodies N. Ohno	12
Preliminary Study on Ductile Fracture of Imperfect Lattice Materials D.N. Fang and X.D. Cui	18
Mechanics of Stretchable Electronics Y.H. Zhang, K.C. Hwang and Y.G. Huang	25
Special Session in Honour of Professor N.K. Gupta on his 70th Birthday	
Damage of Plates due to Impact, Dynamic Pressure and Explosive Loads N. Jones	35
Impact Crushing and Rebound of Thin-Walled Hollow Spheres R.H. Bao and T.X. Yu	40
The Response of Circular Plates to Repeated Uniform Blast Loads S.C.K. Yuen, G. Nurick, N. Ranwaha and T. Henchie	44
Dynamic Characterization of a Fiber-Metal Laminate R.C. Santiago and M. Alves	48
Effect of Configuration and Target Span on the Ballistic Resistance P.K. Gupta, M.A. Iqbal, G. Tiwari and N.K. Gupta	52
Experimental Study on a Graded Stainless Steel Sheet under Quasi-Static and Dynamic Loading F.F. Shi, B. Hou, Y.L. Li, J. Lu and H. Zhao	56
Effect of Strain Rate on Constitutive Behavior of AA-5052 H34 P. Sharma, P. Chandel, V. Mangla, P. Mahajan and M. Singh	60
A Study into the Behavior of an Aluminum Foam under Compression C. Mahesh, A. Deb, S.V. Kailas, C.U. Shankar, T.R.G. Kutty and K.N. Mahule	64
Analysis on Perforation of Ductile Metallic Plates by APM2 Bullets X.W. Chen, Y.B. Gao and L.L. He	68
Impact Loading on Glass/Epoxy Composite Laminates with Nano Clay R. Velmurugan, G. Balaganesan and N.K. Gupta	72
Large Deformations of Inelastic Shells H. Altenbach and V.A. Eremeyev	76
Implicit 2D Numerical Simulation of Materials Submitted to High Strain Rates Including Fracture P.P. Jeunechamps and J.P. Ponthot	80
Numerical Simulation of Large Deformation Problems by Element Free Galerkin Method R. Kumar, I.V. Singh, B.K. Mishra and A. Singh	85
Mechanics of Growing Solids and Phase Transitions A.V. Manzhirov	89
Cellular Rod with Varying Cross-Section under Impact	94

Constitutive Models

Constitutive Equations of Stress-Strain Responses of Aluminum Sheet under Stress Path Changes	
T. Uemori, S. Sumikawa, S. Tamura and F. Yoshida	101
A Constitutive Model for Shape Memory Alloys Involving Transformation, Reorientation and Plasticity	
X.H. Peng, M.M. Chen and J. Wang	105
A Constitutive Description of the Yield Strength and Strain Hardening Behaviors of Nano- Twinned Metals	
C.Y. Gao and W.R. Lu	109
A Phenomenological Energy-Based Model for PBX Simulants Considering the Mullins Effect	
K.S. Yeom, S.W. Jeong, H. Huh and J.S. Park	113
Material Behaviors of PBX Simulant with Various Strain Rates C.H. Park, S.W. Jeong, H. Huh and J.S. Park	117
Crushing Behavior of SKYDEX [®] Material F. Zhu, B.H. Jiang, K.H. Yang, D. Ruan, M.S. Boczek and R. Tannous	121
Dislocation Density Based Plasticity Model Coupled with Precipitate Model L.E. Lindgren and M. Fisk	125
Dynamic Hardening Equation of Nickel-Based Superalloy Inconel 718 K. Ahn and H. Huh	129
Effect of Temperature on the Dynamic Compressive Properties of Magnesium Alloy AZ91D I.R. Ahmad, X. Jing and D.W. Shu	133
Strain Rate Effect on Microstructure of Dynamically Compressed Magnesium Alloy AZ31B I.R. Ahmad, M. Syfiqu, X. Jing and D.W. Shu	137
The Effect of Specimen Size on the Dynamic Compressive Behaviour of Magnesium Alloy	137
AZ31B J. Xiao and D.W. Shu	141
Damage, Fracture and Fatigue	
Some Remarks on the Numerical Modelling of Localized Failure O.T. Bruhns	147
Plastic Deformation Clusters with High Kinetic Energy in Metallic Glass W.D. Liu, H.H. Ruan and L.C. Zhang	152
Comparison Investigation of Tensile Fracture Properties of Al Alloy at Different Dynamic	
Loadings F.Y. Lu, X.F. Wang, R. Chen, X.Y. Li, D. Zhang, Y.L. Lin, C.Y. Zhou and S.Y. Wu	156
Effect of Intermetallic β-Mg ₁₇ Al ₁₂ on Fracture of Ultralight Magnesium Alloy Y.C. Guan and W. Zhou	160
Localized Necking in a Round Tensile Bar with HCP Material Considering Tension- Compression Asymmetry in Plastic Flow	100
J. Yoon, O. Cazacu and J.H. Lee	164
Investigation of Material Instability Behaviors Caused by Combined Stress Loadings W. Ma	168
Cyclic Polycrystalline Viscoplastic Model for Ratchetting of a Body Centered Cubic Metal J. Luo, G.Z. Kang, O.T. Bruhns and C.Z. Zhang	173
A Study on Accelerated Life Test of Spring Unit for Semi-Auto Sliding Mechanism of IT Devices	
Y.P. Jeon, H.Y. Seo, J.D. Kim and C.G. Kang	177
An Influence of Step Cyclic Loading due to Torsion on Tensile Curve Variation Z.L. Kowalewski and T. Szymczak	181
Evaluation of Deformation Behavior of Silica-Filled Rubber under Monotonic and Cyclic Straining	
Y. Tomita, S. Nakata, M. Naito and K. Yashiro	185
Cyclic Behavior of an Industrial Brass Cu Zn32 G. Flegeau, L. Taleb, A. Hauet and C. Vassal	189

Effect of Temperature-Dependent Properties on Cyclic Plasticity of Bond Coat in Thermal Barrier Systems	
L.C. Su, J.G. Li, W.X. Zhang and T.J. Wang	193
Finite Element Simulation of Bending Fretting Fatigue Considering Ratchetting and Cyclic Hardening	
J. Ding, G.Z. Kang, Y.L. Zhu and M.H. Zhu	197
On the Cyclc Behavior of 304L and 316L Stainless Steels L. Taleb	201
Propagation Behavior of Main Crack in Reinforced Concrete Beams Strengthened with	201
CFRP under Cyclic Bending Load Z.W. Li, P.Y. Huang and H. Zhou	205
Materials Characterisation and Processing	
Deformation and Recrystallization Textures of Surface Layers of Aluminum and Copper Sheets Cold-Rolled under Unlubricated Condition	211
D.N. Lee, H.N. Han and H.S. Choi Tensile Strength of Electrospun Poly(ethylene-co-vinyl alcohol) Nanofibre Sheets	211
B. Wang, X. Chao, Y. Li and S.R. Reid	215
Indentation Behavior of a Closed-Cell Aluminum Foam at Elevated Temperatures Z.B. Li, Z.J. Zheng and J.L. Yu	219
Viscosity of Amorphous Materials during Glass-Forming: More from the Adam-Gibbs Law H.H. Ruan and L.C. Zhang	223
Application of Indentation Size Effect in Finite Element Analysis for Friction Simulation M. Taureza, S. Castagne and S.C.V. Lim	227
Surface Roughening and Formability in Sheet Metal Forming of Polycrystalline Metal T. Abe	231
Accurate Prediction Approach of 3D Trimming Line for Auto Panel Part Y.D. Bao, Y. Sang and H.M. Wang	235
A Numerical Approach to Shape Correction of Stamped Products Using Laser Forming Techniques	
J.H. Song, Y. Zhang, J. Lee, G.A. Lee, S.M. Lee, H.W. Lee and S.J. Park	239
An Upsetting - Ironing Type Tribo-Meter for Evaluating Tribological Performance of Lubrication Coatings for Cold Forging M. Hirose, Z.G. Wang and S. Komiyama	243
Closure Behavior of Longitudinal Cavities in a Slab by Side Pressing	
J.J. Park	247
Contact Pressure Dependent Frictional Characteristics of Hot-Dip Galvanized High Strength Steel Sheet and its Effect on Springback Behavior	
S.S. Han	250
Deformation Behavior and Formability of Sheet Metal Laminate Consisting of Perforated Core Sheet and Thin Skin Sheets R. Hino, M. Nakamura, Y. Ishida and F. Yoshida	254
Development of Cup Inner Surface Smoothing Process by Ironing	
A. Tanaka, Z.G. Wang and N. Hibi	263
Development of Electromagnetic-Mechanical Coupled FE-Model for Thin Aluminum Plate Forming Using Electromagnetic Force J.Y. Shim, Y. Choi and B.Y. Kang	267
Dimensional Changes by Heat Treatment of Helical Gear J. Lim, S. Kang and Y.S. Lee	271
Effect of Heat Treatment Conditions on Tube Hydroforming Characteristics of Aluminum	
Alloy M.H. Lee, Y.C. Shin and D.J. Yoon	275
Effect of the Constitutive Laws on the Accuracy of Sheet Metal Simulation D. Banabic	279
Finite Element Analysis Using Dynamic Material Model to Design Process Variables of	
Radial Forging J. Lim, Y.S. Lee and Y.H. Moon	284

A Research on the Principle of Thermo-Stress Sizing and its Application for Titanium Alloy Sheet	
M.H. Chen, L.S. Xie and L. Liu	288
Forming Limit of AZ31 Magnesium Alloy Sheet under Non-Proportional Deformation at Elevated Temperature T. Katahira, T. Naka, M. Kohzu and F. Yoshida	292
Hot Working and Processing Maps of TiC _p Reinforced Aluminum Alloy Matrix Composite S.H. Kim, J.M. Lee, Y.H. Cho, Y.H. Kim and H.J. Kim	296
Influence of Intermediate Principal Stress Effect on Flat Punch Problems Z.Y. Ma, H.J. Liao and F.N. Dang	300
Investigation of Copper Foil Thinning Behavior by Flexible-Pad Laser Shock Forming B. Nagarajan, S. Castagne and Z.K. Wang	306
Metallic Bipolar Plate Fabrication Process of Fuel Cell by Rubber Pad Forming and its Performance Evaluation	310
M.G. Jung, Y.P. Jeon and C.G. Kang NC-Form Grinding of Carbon Fibre Reinforced Silicon Carbide Composite E. Uhlmann, T. Borsoi Klein, L. Schweitzer and A. Neubrand	314
Prediction of Springback of the One-Axle Rotary Shaping Based on Artificial Neural	511
Network X. Jin and S.H. Lu	318
Study on Heading and Thread-Rolling Processes of Magnesium Alloy Screws Y.M. Hwang, K.N. Hwang and C.Y. Chang	322
Temperature and Processability of Magnesium Alloy AZ31 on Rectangular Cup Deep Drawing	
Y. Nakayama, T. Naka, T. Uemori and I. Shimizu The Effect of Interatomic Potentials on the Onset of Plasticity in the Molecular Dynamics	326
(MD) Simulation of Nanometric Machining A. Oluwajobi and X. Chen	330
Tribological Peculiarity of Galling Position in Square Cup Drawing T. Soejima, M.X. Yang, Z.G. Wang and Y. Yoshikawa	334
Non-Linear Large Deformation Kinetics of Polymeric Gel W. Toh, T.Y. Ng and Z.S. Liu	338
First Principle Study for the Melting Properties of Face-Centred-Cubic Aluminum L. Zhou, Q.M. Zhang, G.F. Ji and Z.Z. Gong	342
Beam Assisted Deposition Film for Improving Fretting Fatigue Resistance of Ti-8Al-1Mo-1V Alloy at Elevated Temperature X.H. Zhang, D.G. Xiang and D.X. Liu	346
Structural Plasticity	
Analytical Solution for Elastic and Elastoplastic Bending of a Curved Beam Composed of Inhomogeneous Materials	
G.J. Nie and Z. Zhong Analysis of Elastic-Viscoplastic Behavior of Honeycomb Sandwich Panels Based on a	353
Homogenization Theory for Free Edge Analysis T. Koda and T. Matsuda	357
A Study on the Collapse Characteristics of CFRP Circular Member According to Collision Energy Conditions	261
J.H. Choi, I.Y. Yang and W.C. Hwang Development of Buffer Stopper Using Progressive Compression Process for Crash Energy	361
Absorption of a Railway Vehicle K. Ahn, H. Huh and T.S. Kwon	365
Deformation Behavior of Doubly Curved SS400 Thick Metal Plates by High Frequency Induction-Based Line Heating	260
K.S. Lee Bi-Directional Evolutionary Structural Optimization for Design of Compliant Mechanisms	369
Y. Li, X.D. Huang, Y.M. Xie and S.W. Zhou	373

Effects of Cell-Wall Angle on the Mechanical Properties of Hexagonal Honeycombs L.L. Hu and T.X. Yu	377
Effects of Thicknesses of Sheet and Adhesive Layer on Plastic-Bending of Adhesively Bonded Sheet Metals	
M. Takiguchi, T. Yoshida, M. Funaki and F. Yoshida	381
Elasto-Plastic Property of High Strength Steel at Warm Temperature and its Springback N. Saito, M. Fukahori, D. Hisano, Y. Ichikawa, H. Hamasaki and F. Yoshida	385
Energy Absorption Characteristics of CFRP Double Hat-Shaped Section Member with Various Stacking Condition under Axial Loading W.C. Hwang, I.Y. Yang and Y.J. Yang	389
Experimental Approach for Investigation of Micro Void Behavior on Dual Phase Steel during Plastic Deformation	
T. Ishikawa, T. Ishiguro, N. Yukawa, H. Yoshida and N. Fujita	393
Free Edge Stress Analysis of Unidirectional CFRP Laminates Based on a Homogenization Theory for Time-Dependent Composites K. Goto and T. Matsuda	397
Homogenized Elastic-Viscoplastic Behavior of Thick Perforated Plates with Pore Pressure K. Ikenoya, N. Takano, N. Ohno and N. Kasahara	401
Large Deflection of a Pin-Supported Slender Geometrically Asymmetric Sandwich Beam under Transverse Loading	405
J.X. Zhang, Q.H. Qin, W.L. Ai, Z.J. Wang and T.J. Wang	405
Mechanical Response of Composite Sandwich Panels: Deformation and Energy Absorption M. Vcelka, Y. Durandet, C.C. Berndt and D. Ruan	409
On the Strength of Angle-Patterned Sandwich Cores under Various Loading Conditions X. Lu and B. Wang	413
Plastic-Bending of Adhesively Bonded Dissimilar Sheet Metals M. Takiguchi, T. Tokuda, T. Yoshida, M. Funaki, H. Hamasaki and F. Yoshida	418
Quasi-Static Crush Behavior of Aluminum Hexagonal Honeycomb with Perforated Cell Walls Z.J. Wang, Q.H. Qin, F.F. Wang, J.X. Zhang and T.J. Wang	422
The Collapse Characteristics of CFRP Hat-Shaped Sectional Members under Moisture	
Absorptions Having the Temperature Change Y.J. Yang, I.Y. Yang and J.H. Choi	426
A Study on Injection Molding Analysis and Structural Analysis with Truck Brake Pedal C.W. Park and S.H. Seo	430
A Comparison of EFGM and FEM for Nonlinear Solid Mechanics Problems R. Kumar, I.V. Singh, B.K. Mishra, R. Cardoso and J.W. Yoon	434
Dynamic Plasticity	
Numerical Analysis of Hypervelocity Impact Problems with Large Deformations, High Strain Rates and Spall Fractures	
K.X. Liu, S.Y. Wu and Q.Y. Chen	441
An Experimental Evaluation on Change in Impedance of TRIP Steel Subjected to Plastic Deformation at Various Strain Rates D. Inoshita, S. Yamanaka and T. Iwamoto	445
An Investigation on the Nose Mass Abrasion of Projectile F. Qian, H.J. Wu, F.L. Huang and Y.N. Wang	449
Analysis for the Impact of an Engine Hood to a Radiator Support Frame in a Car Body Structure	
T.F. Hung, C.C. Chang and F.K. Chen	453
Analytical Modelling of a Clamped Sandwich Beam under Impact Loading Y. Liu, W.Z. Jiang and G.X. Lu	457
Blast Resistance of Clamped Cylindrical Sandwich Shells with Metallic Foam Cores L. Jing, Z.H. Wang, L.M. Zhao and V.P.W. Shim	461
Compressive Behavior of Luffa Sponge Material at High Strain Rate J.H. Shen, Y.M. Xie, X.D. Huang, S.W. Zhou and D. Ruan	465

Cooling Tower Shell under Asynchronous Kinematic Excitation Using Concrete Damaged Plasticity Model	
J.M. Dulinska	469
Deformation Mode Dependency on Strain Rate Sensitivity of Volume Resistivity in TRIP Steel T. Iwamoto, S. Yamanaka and A. Rusinek	473
Design Issues of a Kolsky Tension Bar R.R.V. Neves and M. Alves	477
Dynamic Deflection of a Beam on Metal Foam X.M. Xiang and G.X. Lu	481
Dynamic Response of Aluminum Foam Sandwich Panel to Transverse Impact Z.H. Wang, X. Li, Z.Q. Li and L.M. Zhao	485
Effect of Tensile Speed on the Failure Load of Laser Welding under Combined Loading Conditions	
J. Ha, H. Huh, K. Pack and S. Jang	489
Elasticity Effect in Dynamic Response of Beams with Pre-Cracks Impinged by Striker F.L. Chen, T.X. Yu, J.L. Yang and W.H. Wu	493
Experimental Research on Dynamic Mechanical Properties of 5083 Aluminum Alloy Z.W. Zhu, G.Z. Kang, D. Ruan, Y. Ma and G.X. Lu	497
Experimental Study of Sandwich Panels Subjected to Foam Projectile Impact M.A. Yahaya, D. Ruan and G.X. Lu	501
Finite Element and Experimental Study of the Fiber-Reinforced Composite Laminates under Low-Velocity Impact H.Y. Liu, X.M. Qiu, D.Y. Zhang, Y.H. He and J.J. Fan	505
Microstructure Evolution of Ti-46.5Al-2Nb-2Cr at Different Strain Rates and Temperatures	7 00
X. Zan, Y. Wang, Y.H. He, Y. Liu and W.D. Song	509
Numerical Studies on the Blast-Resistant Capacity of Stiffened Multiple-Arch Panel W.S. Chen and H. Hao	514
Numerical Study of Round-Robin Tests on the Split Hopkinson Pressure Bar Technique M.A. Kariem, D. Ruan and J.H. Beynon	518
On the Strength Enhancement of Cellular Materials under Dynamic Loadings S.Q. Xu, D. Ruan, J.H. Beynon and G.X. Lu	522
Possible Schemes to Reduce Nose Blunting of High-Speed Projectile into Concrete L.L. He and X.W. Chen	526
Preliminary Study of Sandwich Panel with Rotational Friction Hinge Device against Blast Loadings W.S. Chen and H. Hao	530
Resistance of Metal Sandwich Plates with Polymer Foam-Filled Core to Localized Impulse	550
Q.H. Qin, J.X. Zhang, T. Wang, Z.J. Wang and T.J. Wang Response of 1100-H12 Aluminum Targets to Varying Span and Configuration	534
M.A. Iqbal, G. Tiwari and P.K. Gupta Analysis on EFP Penetrating against Water-Partitioned Armor	539
Y.Y. Ju, Q.M. Zhang, L. Yang and Z.Z. Gong	543
Wave Dispersion and Attenuation in Viscoelastic Split Hopkinson Pressure Bar H.S.U. Butt and P. Xue	547
Plasticity in Geotechnical Engineering	
3D SPH Modeling of Heterogeneous Materials Failure under Dynamic Loads G.W. Ma, X.W. Yi and X.J. Wang	553
A Dynamic Constitutive Model of Saturated Remolded Loess Z.H. Xiao, H.J. Liao, A. Tuohuti and B. Han	557
A Nonlinear Constitutive Model for Soil under Complex Stress State H.Z. Li, H.J. Liao, B. Han and L. Song	561
Analysis of Slope Failure Mechanisms Considering Micropile-Soil Interaction H.J. Liao, C.L. Tian and H.Z. Li	565

Crushing and Flowing Characteristics of Lightweight Foamed Concrete under Different Loading Rates and Temperatures	
W.G. Guo, J.J. Wang, G.L. Li and Y.J. Shi	569
Experimental Study on Shear Strength Characteristics and Stress-Strain Relationship of	
Loess B. Han, H.J. Liao, H.Z. Li and Z.H. Xiao	574
Investigation on the Damage Process and the Deformation of Concrete Using Meso Element Equivalent Method L. Jin, X.L. Du and G.W. Ma	578
Probabilistic Strength-Reduction Stability Analysis of Slopes Accounting for 2-D Spatial	
Variation J. Ji, H.J. Liao and B.K. Low	582