

CONTENTS

Committees	v
Preface	vii

Part 1

SECTION 1 : AGING & DEGRADATION

Stator Insulation Quality Assessment for High Voltage Motors Based on Probability Distributions H.D. Kim and C.H. Kim	1
Effect of Leakage on Deterioration of Concrete Lining in Conventional Tunnel H.S. Jung, D.G. Kim, S.T. Lee and S.S. Kim	7
Sulfate Attack of Shotcrete Made with Alkali-Free Accelerator S.T. Lee, D.K. Kim, H.S. Jung, G.P. Lee, S.S. Kim and K.P. Park	13
Non-Destructive Assessment for Degradation of 9 Cr Steel J.S. Park, U.B. Baek, W.K. Lee and S.H. Nahm	19
Fretting Wear of Inconel 690 Tubes Tested by Piezo-Actuated Rig I.S. Chung, M.H. Lee and Y.S. Chai	25
Assessment of Creep Damage on a Pipe Bend of 1/2Cr1/2Mo1/4V Steel J.S. Hyun, H.S. Choi, W.S. Choi and G.W. Song	31
Detection of Oil-Paper Insulation Aging with Dielectric Spectroscopy in Time and Frequency Domain Measurements S.H. Lee, J.H. Kim and S.O. Han	37
Temperature Dependence of Return Voltage Characteristics S.H. Lee, Y.H. Kim, J.H. Joeng, S.G. Han, D.G. Park and S.O. Han	43
Finite Element Analysis to Evaluate Wall Thinned Pipe Using PVDF Comb Transducer B.M. Song, J.H. Lee and D.H. Lee	49
Properties of Shotcrete Immersed in Various Harmful Solutions D.G. Kim, H.S. Jung, S.T. Lee and H.S. Shin	55
SECTION 2 : BIO & MEDICAL NDE	
A Morphological Study in the Mandibular Second Premolar Using a Micro-CT K.J. Chun, O.S. Yoo and Y.Y. Won	61
Biomechanical Nondestructive Evaluation of Joint Movements and Muscle Length of Lower Limbs during Hemiplegic Walking S.J. Hwang, J.S. Son, Y.H. Kim and J.M. Park	67

Fault Diagnosis Based on Voxel Data Obtained from CT	
J.C. Han, H.B. Youn and H.K. Kim	73
The Estimation of Knee Varus Torque by an Accelerometer in Osteoarthritis Patients and Healthy Adults	
S.H. Hwang, S.B. Park and Y.H. Kim.....	79
Development of the Health Age Formular and Examination for Women	
J.H. Shin	85
Reconstruction of Images of Speed of Sound from Medical Ultrasound Images	
M.K. Jeong, S.J. Kwon, M.J. Choi and Andrew J Coleman	91
Measurement and Evaluation of Impulse Force Which Human Body Receives by Contact of Machine and Structure	
Y. Itoh, T. Nemoto, S. Yanai, K. Koide, A. Inamori, H. Matsuura and A. Shimamoto.....	97
Evaluation of Hand Function Recovery in Chronic Hemiparetic Patients Using Electromyographic Responses	
K.S. Tae, S.J. Song and Y.H. Kim.....	103
The Balance Recovery Mechanisms against the Forward Perturbation	
S.J. Hwang, H.S. Choi, K.S. Tae and Y.H. Kim.....	109
EMG Pattern Recognition Using Neural Networks during the Postural Balance Control of Human Body	
H.K. Choi, J.H. Jeong and W.H. Cho.....	115
Passive Elastic Characteristics and Musculoskeletal Kinematics of Human Foot for Biomechanical Analysis	
H.K. Choi, S.Y. Kim and W.H. Cho.....	121
EMG Analysis of Muscular Fatigue and Muscle Activity Due to Turtle Neck Syndrome	
W.H. Cho, W.Y. Lee, S.H. Yoon, C.H. Jeong and H.K. Choi.....	127
The Relationship among the Center of Pressure, the Center of Mass and the Horizontal Acceleration of the Body in Postural Sway, Falling and Walking	
H.S. Choi and Y.H. Kim.....	133
Joint Moments and Lumbar Curvatures during Symmetrical Lifting	
S.H. Hwang, S.J. Hwang, Y.E. Kim and Y.H. Kim	139
Determination of the Material Property for the Rear Fixation Device of the Vertebrae by FEM	
D.J. Oh, S.H. Yoo, J.H. Song, Dhaneshwar Mishra and S.C. Hwang	145
A FES Sensor System Using a Tilt Sensor for Improving Hemiplegic Gait	
S.W. Park, J.S. Son, S.J. Kang and Y.H. Kim	151

Homogeneity and Ranklet Based Mass-Type Cancer Detection in Dense Mammographic Images	
W.H. Kim and S.M. Kim	157
The Evaluation of Usefulness of the FEA and Relationship between Trabecular Microstructural and Biomechanical Properties in Human Femoral Head	
M.H. Baek, W.Q. Cui, K.J. Chun, Y.E. Kim, Y.Y. Won and J.H. Hur	163
Evaluation Algorithm Based on Automatic Image Analysis for Malarial Blood Cell Images	
C.H. Kim, J.Y. Kim and S.H. Hong	169
A Study on the Performance of 3D Acoustic Field Analysis Method for the Evaluation of Medical Ultrasonic Probe	
W.J. Yu, S.C. Noh, H.G. Min, M.K. Park and H.H. Choi	174
Measurement of Shaking for the Sacral-Region Circumference Skin under State of Decubitus	
T. Nemoto, Y. Ito, C.C. Lee, Z. Isogai, K. Koide, N. Noda, H. Matsuura, H. Isoe, H. Yamashita, H. Okano and F. Nogata	180
Mechanical Properties of the Human Carotid Artery Using Ultrasonography and Presumption of Arteriosclerosis	
T. Nemoto, Y. Ito, H. Matsuura, Y. Yokota, Y. Kawamura, M. Maruyama and F. Nogata	186
SECTION 3 : COMPOSITE MATERIALS & STRUCTURES	
Characterization of Structural Performance in Ceramic Matrix Composites	
J.G. Kim and J.H. Lee	192
A Study on Natural Frequency Detection of Vehicle Components; Sensors and Actuators	
B.S. Kim, K.C. Shin, J.S. Yoon and H.J. Park	198
A Study on the Fire Resistance Capacity of Asymmetric Slimflor Beam Members	
S.H. Han and S.K. Choi	203
A Study on Stress Analysis and Experimental Evaluation for the All Composite Structure of Wig Vehicle	
J.D. Han, Y.S. Lee, K.J. Kang and H.K. Jeong	209
An Elastic-Plastic Finite Element Analysis of the Interface with Perpendicular Crack Using the Property Gradient in Fiber Reinforced MMC	
J.W. Kang and O.H. Kwon	215
A Study for Load Bearing Capability of Laminates with Embedded Shape Memory Alloy Subjected to Low Velocity Impact	
K.W. Kang and J.K. Kim	221

Nondestructive Testing and Strength Prediction of Adhesive Bonded Joints Using the Scan Type Magnetic Camera H.C. Yoon and J.Y. Lee.....	227
A Study on the Light-Weight Thin-Walled Member for Optimum Crashworthiness Design K.S. Lee, H.K. Seo, W.C. Hwang, I.Y. Yang and K.H. Im.....	233
Influence of Stacking Condition on Axial Compression and Bending Collapse of the Hybrid Hat Shaped Member J.H. Kim, J.H. Kim, J.W. Park, Y.J. Yang and I.Y. Yang	239
A Study on the Drilling Characteristics According to Drill Diameter of Laminate Composite S.C. Lee, S.T. Jeong, J.N. Park and G.J. Cho	245
SECTION 4 : FATIGUE & FRACTURE	
Effect of Wear to the Fatigue Life of Shaft Based on Product Lifecycle Management Y.T. Li, Y.B. Wei and M. Song.....	252
Compressive Fatigue Strength of Al-Alloy Foam with Different Thicknesses M. Hossain, I.H. Kim, K.W. Shin and A.E. Kim.....	258
Study of Experimental Examination on Strength Evaluation in the Design of Double Column for S. Sasaki, K. Hagiwara and T. Ezumi	264
Evaluation of Fracture Toughness of Interfacial Cracks Subjected to Mechanical and Thermal Load Using Finite Element Method D. Mishra, S.H. Yoo, D.J. Oh, J.H. Song and Y.T. Lee	270
High-Velocity Impact Characteristic of CFRP Composite R. Kubota, D. Numata, M. Anyouji, A. Shimamoto and K. Takayama.....	276
Wear Amount Prediction of Automobile Tire by Finite Element Analysis J.H. Lee, J.R. Cho and J.H. Choi	282
Transformed Solution for Fixed Specimen with Notches by Infinitely Similar Element Method Y.T. Li, W.Y. Jin and C.F. Yan.....	288
Stress Analysis on Discontinuous Finite-Width Plate by Hybrid Method L. Chen and T.H. Baek.....	294
Fatigue Analysis of the Cervical Plate System Installed in Cervical Spine Using Finite Element Method I.C. Yang, S.M. Kim and S.Y. Cho.....	300

Durability Analysis of Rubber Diaphragm for Vehicle Suspension Damper System S.K. Koh, T.H. Baek and H.Y. Hwang.....	306
Failure Assessment Analysis to API 5L X65 Pipeline Subjected to Large Plastic Deformation J.H. Baek, Y.P. Kim, W.S. Kim and C.S. Seok.....	312
Fatigue Crack Growth Behavior for Welded Joint of X80 Pipeline Steel Y.P. Kim, C.M. Kim, W.S. Kim and K.S. Shin	318
An Analysis for Fatigue Behavior of the Brazed Joints H.J. Shim, K.W. Kang and J.K. Kim	324
Evaluation of Fatigue Strength of the Bogie Frame for Electrical Multiple Unit S.C. Yoon and J.G. Kim	330
An Evaluation of Residual Stress Redistribution Caused by Fatigue Crack Propagation by Finite Element Method E.J. Park, E.J. Kim and S.H. Yoo.....	336
Fatigue Strength Analysis of the Web Plate of Wheels Using Critical Plane Approach J.W. Seo, S.J. Kwon and S.T. Kwon	342
Fatigue Behavior of Inconel Alloys Due to Fretting and High Temperature S.W. Woo, J.D. Kwon, D.K. Park and C.Y. Lee.....	348
Influence of the Damaged Blade of a Multiple-Stage Axial Compressor on Turbine Components of the Heavy-Duty Gas Turbine M.S. Kang, W.N. Yun, K.Y. Kim and J.S. Kim.....	354
Influence of Stress and Excitation Size on the Velocity of Compression Wavefront in Jointed Rock Masses M.S. Cha, E.S. Hong, S.H. Baek and G.C. Cho	360
X-Ray Diffraction Analysis on Fatigue Fracture Surface of SG365 Steel M.B. Lim, W.J. Park, J.D. Son and G.S. Choi.....	366
The Study of Evaluation Tensile Characteristics and Plane Strain Fracture Toughness in Induction Surface Hardened of the SM53C Steel H.B. Jeon, S.C. Huh and W.J. Park.....	375
Fracture Characteristics of Ceramic Plates Using Shock Tunnel K.J. Kim, J.H. Kim, Y.S. Lee, J.H. Park, K.H. Song, S.H. Koo and S.I. Moon	382
An Evaluation of Fracture Toughness for Ceramics K.J. Kim, J.H. Kim, Y.S. Lee, N.S. No, S.H. Koo and S.I. Moon.....	388
Fatigue Life of Compound Cylinder Combining Autofrettage and Shrink Fit Due to the Firing Y.S. Lee, J.H. Park, J.H. Kim, Q.M. Yang, K.U. Cha and S.K. Hong.....	394

Fatigue Life Evaluation of Pipe Welds in Power Plant Using Advanced Nondestructive Methods	
S.G. Lee, S.K. Park, K.B. Yoo and D.G. Park	400
A Study on Accelerated Life Test Utilizing Fatigue Damage Theory for Automobile Components	
D.H. Jung, Y.W. Choi, B.K. Lim and S.I. Bae	406
Comparison of Fatigue Properties of Al Alloys for Chassis Components	
C.Y. Kim, J.H. Park, J.Y. Park, B.I. Choi, H.J. Lee, S.M. Hyun and J.S. Kim.....	412
SECTION 5 : GUIDED WAVE	
Acoustic Performance of a Magnetostrictive Strip Sensor for a Torsional Guided Wave	
Y.M. Cheong and S. Kim.....	418
A Study on Time Domain Computer Simulation of Ultrasonic Guided Wave Mode Conversion	
Y.H. Cho, Y.K. Choi and N.H. Kim	424
Signals of Magnetostrictive Sensors on Artificial Defect Pipes of Carbon and Stainless Steel	
D.S. Koo, S. Kim, Y.M. Cheong and C.S. Park	431
Welding Zone Defect Detection Usefulness Estimation of Laser Guided Lamb Wave	
K.S. Song and J.Y. Kim	437
A Study of Guided Ultrasonic Wave Application for Heat Exchanger Performance Improvement	
Y.H. Cho, J.h. Jung and J.H. Kim	443
Study on Mode Switching Algorithm and Damage Evaluation for Efficient and Precision SHM Using Smart Sensor	
Y. Hong, B.H. Han, D.P. Hong and Y.M. Kim	450
Bumper Impact Perception for Pedestrian Protection Using Smart Sensor	
Y. Hong, G.P. Wang, H.W. Park, D.P. Hong and Y.M. Kim.....	456
SECTION 6 : HEALTH MONITORING OF STRUCTURE	
Wideband Radar Imaging Of Concrete Specimens for NDT	
H.C. Rhim and J.W. Oh	462
Health Monitoring of Composite Structures Based on Acoustic Wave Sensing Using Fiber Optic Sensors	
B.R. Mattapally, M.R. Bhat and Murthy C.R.L.	467

Application of Genetic Algorithm and Gauss-Newton Method to System Identification	
Grace S. Wang and Fu-Kuo Huang.....	475
A Study on Remote Monitoring and Security of Control System Using IPSEC	
H.J. Na, W.K. Lee, S.H. Nahm, D.H. Ryu, S.H. Lee and S.C. Lee.....	481
Health Monitoring of Steel Crane Girder Using PZT Sensors	
K.J. Shin, H.J. Kim, C.W. Jung and W.J. Kim.....	487
Characterization of Crack Detection Methods Using Strain Mode Shapes on Plates with Various Geometry	
B.S. Kim and S.H. Yoo.....	499
Detection of Various Damage Patterns Using Impedance Measurement and Statistical Post Processing	
Y. Hong, S.H. Hwang, D.P. Hong and Y.M. Kim.....	505
Measurement and Monitoring of Mechanical Loads of Large Slender Structures Using Distributed Fiber Optic Sensor	
J.W. Lee, Y.C. Huh, J.H. Park, Y.Y. Nam, G.H. Lee, Y.J. Park, J.Y. Kim, Y.S. Kim and Y. B. Lee.....	511
Material Characterization of Lock Plate for Gas Turbine Plant	
Y.H. Cho, K.S. Jeong, L.J. Jin and C.Y. Lee.....	517
The Precise Measurement of Steel Cable Tension in Cable Stayed Bridges by Nondestructive Magnetic Sensor	
H.W. Park, B.Y. Ahn, S.S. Lee and W.G. Lee.....	524
SECTION 7 : IMAGE PROCESSING	
Visualization of Tooth for Non Destructive Evaluation	
H. Gao, M. Julius Hossain, O. Chae and Jim X. Chen.....	536
Image Processing Based Defect Inspection System for Pharmaceutical Products	
H.J. Kim, D.H. Ryu and T.W. Choi.....	542
Characterization of Self-Assembled Monolayers by Using a Near-Field Microwave Microprobe	
H. Melikyan, T. Sargsyan, A. Hovsepian, A. Babajanyan, S.W. Kim, J.C. Kim, K.J. Lee, B. Friedman and R. Levicky.....	548
Image Segmentation Based on Fuzzy MFA	
K.D. Ban and Y.K. Chung.....	554
Low Error and Real-Time Stereo Vision Algorithm for 3D Visual Inspection	
S.C. Park and H. Jeong.....	560

Analysis of the Detection of Voids of Construction Joints and Shapes of Inner Cavities in Concrete Using an Ultrasonic Pulse Velocity Method S.K. Park and D.H. Choi.....	566
Radial Image Processing in the Discrete Polar Coordinate W.H. Kim, H.J. Kim and S.M. Kim.....	572
Nonlinear Diffusion Equation for Image Denoising in Mixed-Gaussian Noise Environment H.I. Hahn and D.H. Ryu	578
Study on the Fiber Orientation of Weld Line Parts during the Injection Molding of Fiber Reinforced Plastic by Image Processing J.W. Kim and D.G. Lee	584
Real-Time Face and Hand Discrimination and 3d Position Extraction Using a Stereo Vision Embedded System Y.K. Kim, H.C. Shin, J.I. Cho and D.H. Hwang.....	590
Non-Destructive Evaluation of Cement-Grout by Surface Electrical Resistivity Method M. Farooq, J.H. Kim, S.G. Park and Y.S. Song.....	599
Efficient Clustering Based on the Image Context for the Object Recognition E.J. Koh, P.K. Rhee, J.H. Won and C.S. Bae	605
The Development of Displacement Measurement System by Using CCD Camera H.S. Jeon, Y.C. Choi, J.C. Lee and J.W. Park	611
Image Restoration by Using a Wiener Filter Designed for Digital X-Ray Imaging Systems S.Y. Lee, S.I. Choi, H.S. Cho, J.E. Oh, K.Y. Kim, B.S. Lee and S. Kim	617
SECTION 8 : IR THERMOGRAPHY	
Current and Future Role of Medical Thermography J.Y. Park.....	623
Experimental Design and Evaluation of Thermographic Reference Block W.T. Kim, J.H. Park and K.S. Kang.....	629
Detection of Defects in Lumber Using IR Thermography C.D. Eom, Y.J. Han, K.M. Kim, K.B. Kim, J.J. Lee and H.M. Yeo.....	635
A Study on Nondestructive Evaluation of Painted Metal by Using IR Thermography S.H. Chol, K.S. Song and J.Y. Kim.....	641
Fast and Reliable Detection of Superficial Intracranial Hemorrhage by Hand-Held Device Using Near-Infrared J.Y. Park, S.D. Kim and D.J. Lim	647

SECTION 9 : MATERIALS PROPERTIES

AE Characteristics of Pre-Cracked Charpy Specimens for the Multi-Passed Weldment for the Pressure Vessel Steel E.G. Na, H. Kim and S.K. Lee	653
Deformation of Pure Magnesium in Tensile Test Investigated by STFT of AE Signals Y. Li and M. Enoki	660
Dynamic Characterization on Al-Alloy Foam Damaged By Cyclic Load I.H. Kim, S.G. Kim, A.K. Kim, S.J. Kim and J.H. Park	666
Glucose Concentration Monitoring Using a Surface Plasmon Polariton A. Babajanyan, J.C. Kim, K.J. Lee, R. Khachatryan and K. Nerkararyan	672
Stiffness and Energy Loss Characteristics during Saturating-Drying Process in Low Porosity Rock T.M. Oh, M.S. Cha, G.C. Cho and E.S. Hong	678
Numerical and Experimental Studies on Cooling Patterns of Al-Mg System Alloy Material during the Casting Product Process Y.K. Oh, H.S. Yoon and H.D. Yang	684
Homogenized Material Properties and Mechanical Behavior of Hybrid Functionally Graded Composites J.H. Choi and J.R. Cho	690
Glucose Biosensing by Using a Microwave Dielectric Resonator J.C. Kim, A. Babajanyan, S.W. Kim, H.K. Lee, J.Y. Kim and K.J. Lee	696
Influence of Fineness of Limestone Powder on External Sulfate Attack H.S. Jung, S.T. Lee, K.P. Park and S.S. Kim	702
Enhancement of Detection Efficiency for G-Type Nerve Agent Simulants Based on DBR Porous Silicon S.H. Jang, J.H. Kim, Y.D. Koh and H.L. Sohn	708
An Analysis for Mechanical Properties of Rubber Granule Layer of Synthetic Surfaced Track K.W. Kang, H.J. Shim, J.K. Kim and J.B. Park	714
The Measurement of Thermal Diffusivity for Semi-Infinite Solid Using the Photothermal Displacement Method P. S. Jeon, J. H. Kim, H. J. Kim and J. Yoo	720
A Study on the Bauschinger Effect of Gun Barrel High Strength Steel W.S. Shim, J.H. Kim, Y.S. Lee, S.K. Hong and G.U. Cha	728

The Effect of Shot Peening on the Improvement of Fatigue Strength and Fatigue Crack Characteristics of the Aluminum Alloys
 T.H. Song, M.B. Lim, S.C. Huh and W.J. Park 734

A Study on the X-Ray Diffraction Analysis and the Fatigue Crack Growth Behavior for the Aluminum Alloys
 M.B. Lim, J. Jun, S.C. Huh and W.J. Park 743

A Study on Laser Surface Hardening of Tool Steel Using Optical Pyrometry
 Y.T. Yoo and H.J. Shin 751

The Effect of Niobium According to Solution Annealing and Age Hardening of High Strength Steel
 B.H. Choi, K.C. Jang and B.K. Choi 757

A Study on the Supercooling Characteristics of TMA-Water Clathrate Compound as Low Temperature Latent Heat Storage Material
 C.O. Kim, N.K. Chung and J.H. Kim 763

Optical Characterization of Sensory Rhodopsin II Thin Films Using a Near-Field Microwave Microscope
 S.H. Kim, Y.W. Yoon, A.R. Choi, K.H. Jung, K.J. Lee, B. Friedman and T. Ishibashi..... 769

SECTION 10 : MICRO SENSOR AND MEMS

Angle Effect of Micro-Scale Crosshatch Grooved Patterns under Lubricated Sliding Contact
 Y.H. Chae..... 775

Effect of Micro-Scale Dimple Size on Steel Surface under Lubricated Sliding Contact
 Y.H. Chae..... 780

SECTION 11 : MODELING AND SIMULATION

Finite Element Analysis of Laser Stitch Welded High Strength Steels for Automotive
 H.S. Bang, H.S. Bang, Y.K. Lee, C.I. Oh and C.S. Ro..... 786

Evaluating the Quality of Soil Grouting by the SASW Method
 P.H. Tsai and J. Lai 792

Stress Analysis of Mandibular First Premolar with Finite Element Models
 K.J. Chun, O.S. Yoo, K.R. Park and S.H. Yoo 798

Cascaded Linear-Systems Analysis of CMOS Flat-Panel Detectors for Digital Radiography
 S.M. Yun, M.K. Cho, C.H. Lim, H.K. Kim, T. Graeve, H.S. Cho and J.M. Kim..... 804

Numerical Analysis on 3-Dimensional Thermal Deformation of Automobile Tire Mold Using Al Alloy 5000 Series Material Y.K. Oh, Y.S. Kim and H.S. Yoon.....	810
Modeling of Dielectric Response of Oil-Paper Insulation Systems Using Return Voltage Method S.H. Lee, D.G. Park and S.O. Han	816
Residual Stress Analysis and Measurement of Fuel Injection Pipe S.K. Koh and E.G. Na.....	822
Numerical Analysis and Experimental Studies on Current Shunts for Clamp on Meter W.W.S. Wijesinghe and Y.T. Park.....	828
System Identification of a Steel Bridge Using Modal Flexibility Matrix K.Y. Koo, D.K. Kim, J. Cui and H.Y. Jung.....	834
Geometric Calibration in CBCT Using Coordinates-Transformed Sampling S.K. Heo, M.K. Cho and H.K. Kim.....	841
Inverse Analysis of Stress-Strain Distribution from Monitored Response of Structures H.S. Shin, D.G. Kim and S.H. Baek.....	846
Optimal Design of an Linear Motion Mechanism J.S. Lee and E.J. Park	852
Effects of Pulse Train Characteristics on the Through Transmission Pulsed Eddy Current Signal Y.K. Shin and D.M. Choi.....	858
A Study on the Critical Fracture Pressure on the Al₂O₃ Ceramic Circular Plate under Shock Impact Y.S. Lee, J.H. Lee, J.H. Kim, J.P. Kong, K.J. Kim, S.H. Koo and S.I. Moon	865
A Study on Evaluation of Shear Strength of Nature-Friendly Costal Environment Block Connection C.H. Kim	871
Simulation Studies for the Influence of Tomographic Parameters on the Image Quality of Digital X-Ray Tomosynthesis J.E. Oh, S.I. Choi, M.S. Lee, K.Y. Kim, S.Y. Lee, H.S. Cho, B.S. Lee, and S. Kim..	877
The Characteristics of Bilge Separation Sensor System for Improving Accuracy W.S. Che, K.W. Kim and H.S. Kwon.....	883
A Study on the Evaluation Sliding Behavior of Nature-Friendly Assembled Conduit Connection C.H. Kim	889

Design and Simulation of Roll Forming Process for Under Rail	
S.H. Jeong, S.H. Lee and G.H. Kim.....	895
Possible Effects of FSW Tool Pin Configuration on Residual Stress Distribution	
Y.G. Kweon, Rajesh S.R, H.J. Kim, W.S. Chang, C.K. Chun and S.J. Kim.....	902
Design and Characterization of MR Damper	
H.L. Kim, Y.S. Lee, E.Y. Lee and G.S. Lee.....	908
Time Reversal Reconstruction of Dispersive Ultrasonic Lamb Waves in Thin Plates	
H.J. Jeong	914
SECTION 12 : NDE FOR BIOSYSTEM AND AGRICULTURE	
Investigation of Rice Taste Elements at Wide Area, Using Remote Sensing and GIS Technology	
T. Ueda, C. Ryu, M. Suguri and M. Umeda.....	920
Line-Scan Spectral Imaging System for Online Poultry Carcass Inspection	
K. Chao, C.C. Yang and M.S. Kim	926
Bending Strength Prediction of Structural Lumber by X-Ray Scanner	
J.K. Oh, K.M. Kim, K.B. Shim, J.H. Park, H.M. Yeo and J.J. Lee	932
Field Application of the Ultrasonic CT Technique for Evaluating Deterioration in Ancient Wooden Building	
S.J. Lee, K.M. Kim and J.J. Lee	939
Estimation of Optimal Plucking Time of Green-Tea Using Canopy Reflectance	
T. Kurimoto, C.S. Ryu, M. Suguri and M. Umeda.....	945
Sampling and Calibration Requirements for Soil Property Estimation Using NIR Spectroscopy	
K.S. Lee, D.H. Lee, Kenneth A. Sudduth and S.O. Chung	951
Detection of Bone and Cartilage of Beef Using Magnetic Resonance Imaging	
S.M. Kim, C. Garvey, D. Williams, Y.S. Seo and M. Mccarthy.....	957
Realtime Monitoring of Tomato Concentrate Processing Using RF Sensors	
S.M. Kim, C. Garvey, T. Leary and M. Mccarthy.....	963
Cataloging of Olive Accessions Using Magnetic Resonance Technique	
S.M. Kim, E. Stover, J. Hansen and Michael J. Mccarthy	969
Quantitative Evaluation of Knot in Japanese Larch Lumber Using X-Ray Scanning	
J.K. Oh, K.M. Kim, K.B. Shim, H.M Yeo and J.J. Lee.....	975
Estimation of Nitrogen Content of Rice Using Hypersepctral Remote Sensing	
C.S. Ryu, M. Suguri and M. Umeda	982

Estimation of Quality and Quantity of Green-Tea by Hyperspectral Image M. Suguri, C.S. Ryu and M. Umeda	988
Detection of Fecal Residue on Poultry Carcasses by Laser Induced Fluorescence Imaging B.K. Cho, M.S. Kim, K.L. Chao, Alan M. Lefcourt, K. Lawrence and B.S. Park	994
Detection of Pathogenic Salmonella in Milk by Using an Impedance Biosensor G.Y. Kim, J.H. Moon, H.J. Kim and A.S. Om.....	1000
SECTION 13 : NDE IN ELECTRONIC INDUSTRY	
Self-Layer Subtractive Digital Tomosynthesis M.K. Cho, S.K. Heo and H.K. Kim	1006
Study for Blade Ceramic Coating Delamination Detection for Gas Turbine C.J. Choi, J.Y. Kim, M.Y. Kim and Y.S. Ahn	1011
Tomography Image Nondestructive Measurement for Melt Polymer Morphology L. Lifu.....	1017
Nondestructive Characteristics of 1080 and 5083 Aluminum Alloy by ECAP K.W. Nam, S.K. Kim, S.S. Park and S.H. Ahn	1023
Characteristics of Laser Transformation Hardening for Rod-Shaped Medium Carbon Steel(SM45C) by Gaussian Beam J.D. Kim, J.S. Oh and W.J. Kang.....	1029
A Study on the Weldability of Aluminized Steel Sheet by Nd:YAG Laser J.D. Kim, M.H. Lee and J.H. Lee	1035
Monitoring of CO₂ Hydrate Formation in Sediments Using Compressional Wave Velocity T.H. Kwon, H.S. Kim, G.C. Cho and J.S. Lee.....	1041
Formation Mechanisms of Weld Defects and Dynamic Behavior of Keyhole in Galvanized Steel Welding by CO₂ Laser J.D. Kim and H.J. Park	1047
SECTION 14 : NDT FOR INFRASTRUCTURE	
The Development and Application of a New Elastic-Wave-Based Scanning System for Imaging Defects inside Concrete Structures J.H. Tong, S.T. Liao, C.L. Chiu and W.Y. Juan	1053
Spectral Energy Transmission Method for Crack Depth Estimation in Concrete J.Y. Min, C.B. Yun, S.W. Shin and J.Y. Zhu	1059
Development of Landslide Early Detection System Using Microwave H.C. Rhim and L.H. Jin	1065

Feasibility of Evaluating the Compaction Quality of Soils by the Impact Echo Method

J. Lai, C.Y. Chiu and C.C. Cheng	1070
Color Change and Residual Compressive Strength of Concrete Exposed to High Temperature Using Spectrophotometric Method	
J.W. Lee, K.H. Choi and K.P. Hong	1076
Identify the Locations of Concrete Cracks with Employing the Improved Active Contour Model to Extract Regional Boundaries from GPR	
Y. Huang and S.C. Hsu	1082
Non-Destructive Evaluation of Asphalt Concrete Pavement System Using FWD Tests Considering Modeling Errors	
J.H. Yi, Y.S. Kim, J.M. Kim and S.H. Mun	1088
Nondestructive Identification of Fatigue Cracking in a Composite Actuator with a PZT Ceramic during Electromechanical Cyclic Loading	
S.C. Woo and N.S. Goo	1095
Estimation of Mechanical Properties of Concrete from the Drilling Resistance Parameters	
S.H. Chang, S.W. Choi, G.J. Bae and J.H. Lee	1103
Implementation of Bender Elements for Measuring Stiffness Changes of Concrete Materials Due to Cracking	
Z.O. An, W.S. Shin, E.S. Hwang and Y.J. Mok	1109
A Framework for Nondestructive Evaluation Methods Accounting for Uncertainty of Model and Aging Effect of Concrete	
K.J. Hong and J.S. Kim	1115
A Study of the Structural Internal Assessment of Concrete Slab Using the Ground Penetrating Radar Exploration	
S.U. Hong and Y.S. Cho	1121
SECTION 15 : NDT IN NUCLEAR INDUSTRY	
Remote Measurement of Pipe Wall Thinning by Microwaves	
Y. Ju	1128
3-Dimensional Quantitative Measurement of a Geometric Anomaly in Steam Generator Tubes Using a Diagnostic Eddy Current Probe (D-Probe)	
D.H. Lee, M.S. Choi, D.H. Hur, J.H. Han and M.H. Song	1134
Methodology for Detecting Failed Fuel Assembly in a Liquid Metal Reactor	
S.H. Seong, S. Hur, J.C. Park and S.O. Kim	1140
Development of Magnetic Phase Detection Sensor for the Steam Generator Tube in Nuclear Power Plants	
D. Son, W.I. Joung, D.G. Park and K.S. Ryu	1146

Study on a Neutron Flux Detection and its Digital Signal Processing for Nuclear Reactors S. Hur, J.C. Park, B.H. Kim, S.H. Seong and S.J. Lee	1152
Development of an Underwater UT Inspection System for Reactor Welding Areas Y.R. Choi and J.C. Lee.....	1158
Development of 3D Image Processing Software for UT-NDE of Steam Generator of Nuclear Power Plant M.W. Nam, Y.S. Lee, C.S. Park and O.Y. Yang	1164
SECTION 16 : NDT IN POWER PLANT	
Characteristics of Phased Array UT Crack Evaluation with the Number of Active Element and Scan Angle Changes Y.S. Cho and J.H. Kim.....	1170
Development of Water Absorption Test Equipment for Generator Stator Windings in Power Plant Y.C. Bae, H.S. Kim and D.Y. Lee	1177
Assessment of Fluid Leak for Power Plant Valve Using Pb-free Acoustic Emission Sensor S.G. Lee and S.K. Park.....	1183
Leak Diagnosis of Control Valves for Power Plants Using Multi-Measuring Methods S.G. Lee, J.H. Park and Y.B. Kim	1189
Effects of Magnetic Phase on the ECT Signal in the SG Tubes D.G. Park, K.S. Ryu, D. Son and Y.M. Cheong	1195
SG Eddy Current Issues Updates in Korea S.J. Kim, K.J. Kwon, J.G. Ko, S.G. Lee and H.S. Do.....	1201
Application of Digital Radiography Inspection for Pipe Weldments in the Power Plants S.K. Park, B.C. Park, D.S. Gil, Y.S. Ahn and Y.S. Cho.....	1207
Evaluation of Residual Stress for Boiler Welds in Thermal Power Plant by Nondestructive Method K.B. Yoo and J.H. Kim	1213
Ultrasonic Signal Processing Algorithm for Detecting the Keyway Cracks on Turbine Rotor Disk S.I. Cho, J.K. Lee, U.H. Seong, W.C. Seo, J.O. Lee, Y.H. Son and S.S. Jung	1219

SECTION 17 : NEUTRON RADIOGRAPHY**Experimental Approach for Water Discharge Characteristics of PEMFC by Using Neutron Imaging Technique at NRF, Hanaro**

T.J. Kim, J.R. Kim, M.H. Kim and C.M. Sim..... 1225

SECTION 18 : NEW METHODS AND DEVICES**Optimal Design of an Ultrasonic Array Sensor for NDE Applications**

H.Y. Kim and Y.R. Roh..... 1231

Design of Special Shoes with a Position Control Device for Water Level Gauging in a Bellows Tube

K.M. Koo, C.H. Song, Y.S. Kim, Y.M. Cheong, I.C. Lim and C.S. Park..... 1237

A Study on Inhalation Force Improvements of Ventilation Hood to Remove a Harmful Material

H.D. Yang and Y.K. Oh..... 1243

SECTION 19 : NONLINEAR PHENOMENON**Acoustic Nonlinearity of Zirconium Alloy by a Resonant Ultrasound Spectroscopy**

Y.M. Cheong and Y.S. Kim..... 1249

Experimental Study on Nonlinear Acoustic Properties of Contacting Solid Interfaces

J.Y. Kim, A. Baltazar and J.S. Lee 1255

SECTION 20 : OPTICAL METHOD**A Study on the Analysis of O-Ring under Uniform Squeeze Rate and Internal Pressure by Photoelastic Experimental Hybrid Method**

O.S. Kwon, J.S. Hawong, J.B. Nam, S.L. Han and S.H. Park 1261

Quantitative Magnetic Imaging Using Magneto-Optical Method

T. Ishibashi and K. Sato 1267

Measurement of Modulation Transfer Function of an Optical System by Using Skew Ray Tracing

T.T. Liao, J.F. Lin and C.H. Lu 1273

Digital Speckle Pattern Interferometer to Measure the Deformation Distributions of a Tensile Specimen

S.K. Park, S.H. Baik, H.K. Cha, Y.S. Kim, Y.M. Cheong and H.K. Jung 1279

Measurement of the Concentration of Glucose by a Circular Polariscope with Electro-Optic Modulation

J.F. Lin, T.T. Liao and C.C. Chang 1285

Fabrication and Characterization of Prismatic Band Filter Gradient Rugate Porous Silicon

J.H. Kim, S.H. Jang, Y.D. Koh and H.L. Sohn..... 1291

Analysis of Chemically Induced Residual Stress in Polymeric Thin Film Using Curvature Measurement Method	
S.S. Lee, I.W. Jeon and M.H. Yi	1297

SECTION 21 : RAILWAYS

Fatigue Life Evaluation for the Floor System of a Steel Railway Bridge	
D.H. Choi, H.Y. Choi, H. Yoo, J.S. Lee and S.K. Park	1303

Stress Intensity Factor Calculation on Critical Points of Railway Bogie Frame	
H.K. Jun.....	1309

A Study on Partial Side Wears for the Brake System of Railway Vehicles	
J.H. Song, S.H. Yoo, D.J. Oh, D. Mishra and D.H. Jo	1315

Sensitivity for Internal and Surface Defects of Railway Wheel Using Induced Current Focusing Potential Drop	
S.J. Kwon, D.H. Lee and J.W. Seo.....	1322

The Effect of the Evolution of Contact Surface Profile on Fatigue Crack Nucleation Site in Press-Fitted Shaft	
D.H. Lee, S.J. Kwon, J.B. Choi and Y.J. Kim.....	1328

The Influences of the Wheel Profiles on the Wheel Wear and Vibrational Characteristics of the Passenger Cars Running on the Kyeongbu Line	
C.W. Lee and J.C. Kim	1334

Evaluation of Strength for Bogie Frame of Railway Freight Car through Finite Element Analysis	
Y.S. Ham.....	1340

Measurement of the Lateral Displacement of the Wheel-Rail Based on the Vision Sensor	
M.S. Kim and W.H. You	1346

SECTION 22 : RELIABILITY

Reliability Analysis of Static Bearing Capacity Evaluation of Driven Steel Pipe Piles Using MCS	
J.H. Park, J.W. Huh, K.J. Kim, J.H. Lee and K.S. Kwak	1352

Safety Assessment of Subway Rolling Stocks Using Nondestructive Evaluation and Engineering Analysis Techniques	
J.G. Kim, J.W. Seo, S.C. Yoon and S.T. Kwon.....	1358

Failure Analysis of Integrated Circuits Based on Nondestructive Evaluation	
H.J. Kim, K.H. Um and S.J. Shin	1364

An Analysis of the Main Effect Factors of Brush Wear for Automotive Blower Motors	
W.G. Shin, S.H. Lee and Y.S. Song.....	1370

Design & Reliability of an Optimal Structure Using Neural Network	
J.S. Lee	1376
Comparison of the Mechanical Properties of Laser and Arc Welded 9Cr-1Mo Steel	
C.I. Oh, H.S. Bang, H.S. Bang, M.S. Go, S.J. Kim and C.S. Ro	1382
Artificial Neural Network (ANN)-Based Reliability Analysis of a Fiber Reinforced Polymer (FRP) Deck	
D.H. Kim, D.K. Kim and J. Cui.....	1388
Mechanical Characteristics of Hybrid Welded Joints of Galvalume Steel	
Y.H. Kim, H.S. Bang, S.J. Kim, C.S. Ro and H.S. Bang	1395
Analysis of Round Robin Test for Reliability Evaluation on Ultrasonic Thickness Measurement of Wall Thinned Pipe in Nuclear Power Plant	
J.H. Lee, D.H. Lee and S.H. Lee	1401
Boundary Element Analysis of Osmotic Blistering Behavior of Polymeric Coating Film	
S.S. Lee.....	1408
SECTION 23 : SIGNAL PROCESSING	
Gearbox Condition Monitoring Using Feature Samples and Principal Component Analysis	
W. Li, K. Ding and Z. Yang	1414
An Adaptive Filter for the Minimization of Tracking Error in a Non-Minimum Phase Beam with Uncertainty	
Y.S. Lee	1420
A Robust Error-Adaptive NLMS Algorithm for Echo Cancellations	
M.S. Kim	1426
SECTION 24 : SMART STRUCTURE & SYSTEM	
Development of a Lateral Mode Piezoelectric Oscillator Sensor to Detect Damages in a Structure	
Y.R. Roh and B.S. Kim.....	1432
Retrofit of Concrete Cylinders by Steel Jackets with Lateral Confining Stress	
E.S. Choi, B.S. Cho, Y.S. Chung and S.C. Cho	1438
Piezoelectric Sensor Self Diagnostics Using a Modified Impedance Model	
S.H. Park, C.B. Yun, G.H. Park and Charles R. Farrar.....	1444
Smart Particles Containing Multiple Photonic Band Gaps Based on Rugate-Structured Porous Silicon	
S.J. Kim, S.H. Jang, Y.D. Koh, J.H. Kim, C.Y. Park, J.H. Park and H.L. Sohn	1450

SECTION 25 : VIBRATION**Accurate Vibration Analysis of N-Sided Poplygonal Mindlin Plates with V-Notches or Sharp Cracks**

J.W. Kim and H.Y. Jung..... 1456

Active Structural Control Technique Using Lattice Probabilistic Neural Network Based on Learning Rule

D.H. Kim, D.K. Kim, S.K. Chang, Charito Fe M. Nocete and W.S. Park..... 1462

Corner Stress Singularity Effects on the Vibration of Skew Plates Having V-Notches or Sharp Cracks

J.W. Kim and H.Y. Jung..... 1468

Effects of Tip Mass on Stability of Rotating Cantilever Pipe Conveying Fluid with Crack

I.S. Son, H.I. Yoon, S.P. Lee and D.J. Kim 1474