Review of Progress in Quantitative Nondestructive Evaluation

Hyatt Regency Minneapolis
Minneapolis, Minnesota
July 26 – 31, 2015

PROGRAM

Updated 28 July 2015

Monday, July 27, 2015

PLENARY SESSION 1
Leonard J. Bond, Chairperson
Nicollet BC

9:00 AM **Opening Remarks**
---**Leonard J. Bond**, Iowa State University, Center for NDE, Applied Sciences Complex II, 1915 Scholl Road, Ames, IA 50011

The Sixth European-American Workshop on Reliability
--Christina Müller, BAM Federal Institute for Materials Research and Testing, Berlin, Germany
--Ralf Holstein, DGZfP, Max-Planck-Str. 6, 12489 Berlin, Germany

9:15 AM **Status and Prospect of NDT Technology for Nuclear Energy Industry in Korea**
---**Joon H. Lee**, Pusan National University, Pusan 609-735, Korea

10:15 AM ***Break***

PLENARY SESSION 2
Dale Chimenti, Chairperson
Nicollet BC

10:30 AM **US Air Force Perspectives on Validated/Reliable NDE – Past, Present, and Future**
---**Eric Lindgren**, USAF AFRL-RXLP-NDE Branch, 2230 10th Street, Bldg. 655, Room 172, WPAFB, OH 45433-7816

11:20 AM **Can Automation Automatically Solve "The Human Factors Problem"?...And Other Illusions**
---**Marija Bertovic**, BAM Bundesanstalt fur, Materialforschung und-prufung, VIII.33, Unter den Eichen 87, Berlin, Germany

12:10 PM ***Lunch***

SESSION 3

GUIDED WAVES I

Peter Cawley and Ronald A. Roberts, Co-Chairpersons
Nicollet D1

1:30 PM **1-D Profiling Using Highly Dispersive Guided Waves**
---**Arno Volker**, Tim van Zon, Mick Hsu, and Lennart Boogert, Stieltjesweg 1, P.O. Box 155, 2600 AD Delft, the Netherlands

1:50 PM **Guided Wave Tomography Performance Analysis**
---**P. Huthwaite,** M. J. S. Lowe, and P. Cawley, Imperial College, Mechanical Engineering Department, South Kensington, London SW7 2AZ, United Kingdom

2:10 PM **SAFE-3D Analysis of a Piezoelectric Transducer to Excite Guided Waves in a Rail Web Large**
---**Dineo A. Ramatlo**[1,2], Philip W. Loveday[1], Craig S. Long[1], and Daniel N. Wilke[2], [1]CSIR Materials Science and Manufacturing; [2]Department of Mechanical and Aeronautical Engineering, University of Pretoria

2:30 PM **The Interaction of the Fundamental Torsional Guided Wave with Gaussian Distributed General Corrosion in Pipes**
---**Jacob Dobson** and Peter Cawley, Imperial College, 318 City & Guilds Building, Exhibition Road, London SW7 2AZ, United Kingdom

2:50 PM **Using Scattering Information to Enhance Sparse Array Imaging of Impact Damage in Composite Materials**
---**Westin B. Williams**, Jennifer E. Michaels, and Thomas E. Michaels, School of Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta, GA 30332-0250

3:10 PM ***Break***

3:30 PM **Guided Wave Propagation in Metallic and Resin Plates Loaded with Water on a Single Surface**
---**Takahiro Hayashi** and Daisuke Inouse, Graduate School of Engineering, Kyoto University, Kyoto, 615-8540, Japan

3:50 PM **Multimode Dispersion Compensated Pulse-Echo Guided Wave Inspection**
---**R. Roberts**, L. Koester, and D. Chimenti, Iowa State University, Center for NDE, Applied Sciences Complex II, 1915 Scholl Road, Ames IA 50014

4:10 PM **Guided Wave Attenuation in Coated Pipes Buried in Sand**
---**Eli Leinov**, Michael JS Lowe, and Peter Cawley, NDE Group, Department of Mechanical Engineering, Imperial College, London SW7 2AZ, United Kingdom

4:30 PM **Optimization of Guided Wave Transducer Arrays for the Inspection of Plate Structures**
---**Alexander Velichko**, Department of Mechanical Engineering, University of Bristol, Bristol, BS8 1TR, United Kingdom

4:50 PM **Advanced Signal Processing Methods Applied to Guided Waves for Wire Rope Defect Detection**
---**Javad Rostami** and Peter W. Tse[1], The Smart Engineering Asset Management Laboratory (SEAM) and [1]The Croucher Optical Nondestructive Testing Laboratory (CNDT), Department of Systems Engineering & Engineering Management, City University of Hong Kong, Hong Kong, China

5:10 PM **Domain Decomposition Method for Scattering Problem in 3D Elastic Waveguides**
---**V. Baronian**[1], A.-S. Bonnet-Ben Dhia[2], S. Fliss[2], and A. Tonnoir[1,2], [1]CEA-LIST, Saclay, France; [2]POEMS (UMR 7231 CNRS-ENSTA-INRIA), Palaiseau, France

SESSION 4
THERMOGRAPHY AND THERMOSONICS
Xiaoyan Han and Stephen D. Holland, Co-Chairpersons
Nicollet D2

1:30 PM **Determination of Flaw Size and Depth from Temporal Evolution of Thermal Response**
---William P. Winfree, Elliott Cramer, **Joseph N. Zalameda**, and Patricia A. Howell, Mail Stop 225, 5 West Taylor Street, NASA Langley Research Center, Hampton, VA 23681

1:50 PM **Thermal Property Measurement for Thermal Barrier Coatings Using Pulsed Thermal Imaging – Multilayer Analysis Method**
---**J. G. Sun**[1] and N. Tao[2], [1]Argonne National Laboratory, Argonne, IL 60439; [2]Capital Normal University, Beijing, China

2:10 PM **Multilayer Material Characterization Using Thermographic Signal Reconstruction**
---**Steven Shepard** and Maria Frendberg-Beemer, Thermal Wave Imaging, Inc., Ferndale, MI 48220

2:30 PM **Analysis of Non-contact Acousto-Thermal Signature Data**
---**Amanda Keck Criner** and Norm Schehl, DR-02 USAF AFMC AFRL/RXCA, Wright Patterson AFB, OH 45433

2:50 PM **Evaluation of SonicIR Handheld System on Composite Impact Damage Detection**
---**Xiaoyan Han**, Justin M. Ar-Rasheed, Ding Zhang, and Anthony Lubowicki, Wayne State University, Electrical and Computer Engineering, 5050 Anthony Wayne Dr. #3123, Detroit, MI 48202

3:10 PM ***Break***

3:30 PM **VibroSim: A Hybrid Computational/Empirical Model of Vibrothermography Nondestructive Evaluation**
---**Stephen D. Holland**, Lucas Koester, Jyani Vaddi, Tyler Lesthaeghe, and Brian Schiefelbein, Iowa State University, Center for Nondestructive Evaluation, Applied Sciences Complex II, 1915 Scholl Road, Ames, IA 50014

3:50 PM **Determining Energy Dissipation Rate from Surface Temperature for Vibrothermography Modeling**
--- **Stephen D. Holland**, Tyler Lesthaeghe, and Stephen D. Holland, Iowa State University, Center for Nondestructive Evaluation, Applied Sciences Complex II, 1915 Scholl Road, Ames, IA 50014

4:10 PM **Empirical Modeling of Vibrothermographic Crack Heating**
---**Tyler Lesthaeghe**[1,2], Jyani Vaddi[1,2], Bryan Schiefelbein[1,2], Stephen D. Holland[1,2,] William Q. Meeker[1,3] and Ashraf Bastawros[1,2], Center for Nondestructive Evaluation[1], Department of Aerospace Engineering[2], and Department of Statistics[3], Iowa State University, Ames, IA 50011

4:30 PM **Develop Algorithms to Improve Detectability of Defects in Sonic IR Imaging NDE**
---Qiuye Yu, Omar Obeidat, and **Xiaoyan Han**, Wayne State University, Electrical and Computer Engineering, 5050 Anthony Wayne Dr., #3123, Detroit, MI 48202

4:50 PM **Examination of Spot Welded Joints with Active Thermography**
---**Florian Jonietz**[1], Mathias Ziegler[1], Philipp Myrach[1], Hubert Suwala[2], and Michael Rethmeier[1,2], [1]BAM Federal Institute for Materials Research and Testing, Berlin, Germany; [2]Fraunhofer Institute for Production Systems and Design Technology, Berlin, Germany

5:10 PM **Open**

SESSION 5

EDDY CURRENT FUNDAMENTALS

John Bowler, Chairperson
Nicollet D3

1:30 PM **Exploiting Resonant Frequency Shifts for Novel Eddy-Current Techniques**
---**Robert Hughes**[1] and Steve Dixon[1], [1]University of Warwick, Department of Physics, Gibbet Hill Road, Coventry, CV4 7AL, United Kingdom

1:50 PM **Experimental Validation of an Eddy Current Probe for Defect Detection in Thick Conducting Specimen**
---**Mahesh Raja P**[1], Kavitha Arunachalam[2], [3]Krishnan Balasubramanian[3], [1,2]Department of Engineering Design, [3]Department of Mechanical Engineering, Indian Institute of Technology Madras, Chennai, Tamil Nadu, India-600036

2:10 PM **Eddy Current Testing in Environments that Limit Performance**
--John Bowler, Iowa State University, Center for Nondestructive Evaluation, Applied Sciences Complex II, 1915 Scholl Road, Ames, IA 50011

2:30 PM **Model-Based Inverse Methods for Sizing Surface-Breaking Discontinuities with Eddy Current Probe Variability**
---**John C. Aldrin**, Computational Tools, Gurnee, IL, 60031; Eric B. Shell and Erin K. Oneida, Wyle, Dayton, OH 45440; Harold A. Sabbagh, Elias Sabbagh, and R. Kim Murphy, Victor Technologies LLC, Bloomington, IN 47401; Siamack Mazdiyasni and Eric A. Lindgren, Air Force Research Laboratory, Wright-Patterson AFB, OH 45433

2:50 PM **CHANGE OF PRESENTER: Numerical Modeling of Eddy Current Testing of U-Shaped Tubes by Differential Geometry**
---**Saptarshi Mukherjee**[1], Antonello Tamburrino[1,2], Naiguang Lei[1], Lalita Udpa[1] and Satish Udpa[1], [1]Nondestructive Evaluation Laboratory, Michigan State University, Michigan 48824
[2]DIEI, Università degli Studi di Cassino V. G. Di Biasio, 43 Cassino 03043, Italy

3:10 PM ***Break***

3:30 PM **WITHDRAWN - Numerical Simulation in ACFM Inducer Design -**
---**Wenpei Zheng** and Laibin Zhang, China University of Petroleum-Beijing, 18 Fuxue Road, Changping, Beijing, 102249, China; Taian Fang and Zhixiong Zhou, CNPC Drilling Research Institute, Block A34 CNPC Innovation Centre, W of Xishatun Bridge Shahe Town, Changping District, Beijing, 102206, China

3:50 PM **Characterizing Surface Features on Conducting Specimens Through an Insulation Layer Using Capacitive Imaging Technique**
---**Xiaokang Yin**, An Yan, Zhen Li, Wei Li, and Guoming Chen, Centre for Offshore Equipment and Safety Technique, China University of Petroleum (East China), Qingdao 266580, China; David A. Hutchins, School of Engineering, Warwick University, Coventry CV4 7AL, United Kingdom

4:10 PM **Monotonicity of Time-Constants and Real-Time Imaging in Eddy Current Testing**
---Zhiyi Su[1], **Antonello Tamburrino**[1,2], Salvatore Ventre[2], Lalita Udpa[1] and Satish Udpa[1]. [1]Department of Electrical and Computer Engineering, Michigan State University, East Lansing, MI 48824. [2]DIEI, Università di Cassino e del Lazio Meridionale, 03043, Cassino, Italy

4:30 PM **WITHDRAWN - 3-D Finite Element Modelling of Eddy Current Inspection of Surface EDM Notches Using a Reflection Differential Split-D Probe**
---**Ehsan Mohseni**[1], Demartonne Ramos França[1], Martin Viens[1], Wen Fang Xie[2], Baoguang Xu[2]
[1]Départment de génie mécanique, L'École de technologie supérieure, Montréal, Québec, Canada
[2]Department of Mechanical & Industrial Engineering, Concordia University, Montreal, Quebec, Canada

4:50 PM **In-Situ Calibration of Pulsed Eddy Current Detection of Cracks at Fasteners in CP-140 Aircraft**
---**P. R. Underhill**, C. Stott, and T.W. Krause, Department of Physics, Royal Military College of Canada, Kingston, ON, K7K 7B4, Canada

5:10 PM **Open**

SESSION 6
6th EAW
Lakeshore A

INTRODUCTION TO THE 6TH EAW
Eric Lindgren and Uwe Ewert, Co-Chairpersons

1:30 PM **Holistic Assessment of the Reliability of NDE: Novel Insight on Influencing factors on POD and Human Factors**
---**Christina Müller**[1], Marija Bertovic[1], Daniel Kanzler[1], Mato Pavlovic[2], Martina Rosenthal[1], Ralf Holstein[2], Andrea Gianneo[4], and Ulf Ronneteg[3; 1]BAM Federal Institute for Materials Research and Testing, Berlin, Germany; [2]DGZfP Ausbildung und Training GmbH. Berlin, Germany; [3]SKB Swedish Nuclear Fuel and Waste Management Co., Oskarshamn, Sweden, [4]Politecnico Milano, Italy

2:05 PM **Living Reliability in Industry**
---**Greg Selby**, Electric Power Research Institute, 1300 West W. T. Harris Boulevard, Charlotte, NC 28262

2:40 PM **How NDT is Organized - Influence on the Reliability of NDE**
---**Ralf Holstein**[1] and Christina Müller[2], [1]DGZfP Ausbildung und Training GmbH. Berlin, Germany; [2]BAM Federal Institute for Materials Research and Testing, Berlin, Germany

3:10 PM ***Break***

RELIABILITY OF SHM
David Forsyth and Bernd Koehler, Co-Chairpersons

3:30 PM **SHM Reliability and Implementation Overview – A Personal Military Aviation Perspective**
---**Eric Lindgren**, USAF, AFRL/RXCA, Wright Patterson AFB, Dayton OH, 937-255-6994

4:10 PM **Best Practices for Evaluating the Capability of Nondestructive Evaluation (NDE) and Structural Health Monitoring (SHM) Techniques for Damage Characterization**
---**John C. Aldrin**[2], Charles Annis[3], Eric A. Lindgren[1], and Harold A. Sabbagh[4], [1]Air Force Research Laboratory (AFRL/RXCA), Wright-Patterson AFB, OH 45433; [2]Computational Tools, Gurnee, Illinois, 60031; [3]Statistical Engineering, Palm Beach Garden, FL; [4]Victor Technologies LLC, Bloomington, IN 47401

4:50 PM **Structural Health Monitoring Ultrasonic Thickness Measurement Accuracy and Reliability of Various Time-of-Flight Calculation Methods**
---**Thomas J. Eason**[1,2], Leonard J. Bond[1], Mark G. Lozev[2], [1]Center for Nondestructive Evaluation, Iowa State University, 1915 Scholl Rd., Ames, IA; [2]BP Products North America, Refining & Logistics Technology, 150 W. Warrenville Rd., Naperville, IL 60563

5:10 PM **Structural Health Monitoring and Probability of Detection Estimation**
---**David Forsyth**, TRI/Austin, 9225 Bee Caves Road, Austin, TX 78733

SESSION 7

GUIDED WAVES II

Peter Cawley and Ronald A. Roberts, Co-Chairpersons
Nicollet D1

8:30 AM **Noncontact Excitation of Guided Waves (A_0 Mode) Using an Electromagnetic Acoustic Transducer (EMAT)**
---**P. Fromme**, Department of Mechanical Engineering, University College London, Torrington Place, London, WC1E 7JE, United Kingdom

8:50 AM **Dispersive Matched Filtering of Ultrasonic Guided Waves for Improved Sparse Array Damage Localization**
---Gregory C. Luppescu, Alexander J. Dawson, and **Jennifer E. Michaels**, School of Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta, GA 30332-0250

9:10 AM **Multidimensional Guided Wave Dispersion Recovery for Locating Defects in Composite Materials**
---**Joel B. Harley**[1] and Luca De Marchi[2], [1]Department of Electrical and Computer Engineering, University of Utah, Salt Lake City, UT 84112; [2]Department of Electronics, Computer Sciences and Systems (DEIS), University of Bologna, Bologna, Italy

9:30 AM **Development of an Omnidirectional SH_0 Piezoceramic Transducer**
---**Pierre Belanger** and Guillaume Boivin, Département de Génie Mécanique, École de Technologie Supérieure, 1100 rue Notre-Dame Quest, Montréal (Québec), H3C 1K3, Canada

9:50 AM **A PVDF Array Sensor for Lamb Wave Reception for Aircraft SHM**
---**Baiyang Ren** and Cliff Lissenden, The Pennsylvania State University, Department of Engineering Science and Mechanics, University Park, PA, 16802

10:10 AM ***Break***

10:30 AM **Wave Mode Extraction from Multimodal Guided Wave Signal in a Plate**
---**Madis Ratassepp** and Zheng Fan, Nanyang Technological University, School of Mechanical and Aerospace Engineering, 50 Nanyang Avenue, Singapore 639798

10:50 AM **Defect Depth Sizing Using Guided Waves**
---**Adam C. Cobb** and Jay L. Fisher, Sensor Systems and NDE Technology Department, Southwest Research Institute, San Antonio, TX 78228

11:10 AM **Monitoring Thicknesses Along a Line Using Guided Waves**
---**R. Howard** and F. Cegla, NDE Group, Imperial College London, Exhibition Road, South Kensington SW7 2AZ, United Kingdom

11:30 AM **Practical Ultrasonic Damage Detection on Pipelines Using Component Analysis Methods**
---**Chang Liu**, Jacob Dobson, and Peter Cawley, Imperial College, 310A City & Guilds Building, Exhibition Road, London SW7 2AZ, United Kingdom

11:50 AM **Investigation on Empowering One Direction Emission of Guided Waves to Avoid Undesired Reflections from Other Pipe Attachments.**
---**Peter W. Tse** and Fang Zhou, The Smart Engineering Asset Management Laboratory (SEAM) and The Croucher Optical Nondestructive Testing Laboratory (CNDT), Department of Systems Engineering & Engineering Management, City University of Hong Kong, Hong Kong, China

12:10 PM ***Lunch***

SESSION 8

ADDITIVE MANUFACTURING AND MATERIAL CHARACTERIZATION

Martin Spies and Evgueni Todorov, Co-Chairpersons
Nicollet D2

8:30 AM **Additive Manufacturing: NDE Challenges and Opportunities**
---**Martin Spies**, **John Slotwinski,** The Johns Hopkins University Applied Physics Laboratory, 11100 Johns Hopkins Road, Laurel, MD 20723-6099; Martin Spies, Fraunhofer Institute for Nondestructive Testing IZFP, Campus E3 1, 66123 Saarbrücken, Germany

8:50 AM **Nondestructive Evaluation of Additive Manufactured Aerospace Components with Complex Shape. A Literature Review**
---**Evgueni Todorov**, Roger Spencer, Sean Gleeson[1], Scott Newhouse, Mahdi Jamshidinia, and Shawn Kelly, Edison Welding Institute (EWI), 1250 Arthur E. Adams Dr., Columbus, OH 43221; [1]Progenero Products, 609 14th Street SW, Suite 100, Loveland, CO 80537

9:10 AM **On- and Offline Ultrasonic Characterization of Components Build by SLM Additive Manufacturing**
---Hans Rieder and **Martin Spies**, Fraunhofer Institute for Nondestructive Testing IZFP, Campus E3 1, 66123 Saarbrücken, Germany; Joachim Bamberg and Benjamin Henkel,
MTU Aero Engines AG, Department TAFP, Dachauerstrasse 665, 80995 Munich, Germany

9:30 AM **Inspection of Additive Manufacturing Parts Using Laser Ultrasonics**
---**Daniel Lévesque**, Martin Lord, Christophe Bescond, and Jean-Pierre Monchalin, National Research Council Canada, Boucherville, Qc, Canada; Priti Wanjara and Xinjin Cao, National Research Council Canada, Montreal, Qc, Canada

9:50 AM **Measuring Internal Features and Defects in AM Components Using X-Ray Computed Tomography**
---**G. Jones**, A. Grow[1], S. Hyde[1], and T. A. Palmer, Applied Research Laboratory, Pennsylvania State University, [1]The Timken Company, North Canton, OH 44706

10:10 AM **Break**

10:30 AM **WITHDRAWN - Ultrasonic Characterization and Assessment of Bonding between Adjacent Structures in Polymeric Additive Manufacturing**
---**Vinay Dayal** and Richard Livings, Iowa State University, Center for Nondestructive Evaluation and Department of Aerospace Engineering, Ames IA 50011

10:50 AM **Non-Destructive Evaluation for Additive Manufacturing**
---**Jethro Coulson**[1], Rikesh Patel[1], Steve Sharples[1], Adam Clare[2], Wenqi Li[1], Richard Smith[1], Matthias Hirsch[2], Chris Tuck[2], and Matt Clark[1]; [1]Applied Optics Group; [2]Additive Manufacturing and 3D Printing Group – University of Nottingham

11:10 AM **Relationship Between Near-Surface Ultrasonic Shear-Wave Backscatter and Grain Size in Metals**
---**Brady J. Engle**[1,2], Frank J. Margetan[1], and Leonard J. Bond[1,2,3], [1]Center for Nondestructive Evaluation, 1915 Scholl Road, 111 ASC II, Iowa State Univeristy, Ames, IA 50011; [2]Department of Aerospace Engineering, 1200 Howe Hall, Iowa State University, Ames, IA 50011; [3]Department of Mechanical Engineering, 2025 Black Engineering, Ames, IA 50011

11:30 AM **Statistical Flaw Characterization Through Bayesian Shape Inversion from Scattered Wave Observations**
---**Jerry McMahan**[2] and Amanda Criner[1], [1]Air Force Research Laboratory, Materials and Manufacturing Directorate, Wright Patterson AFB, OH 45433-7817; [2]Structural Integrity Division, University of Dayton Research Institute, Dayton, OH 45469

11:50 AM **Creep-Induced Nonlinear Ultrasonic Changes in High Cr Ferritic Heat Resisting Steel Welded Joint**
---**Toshihiro Ohtani**, Takumi Honma, and Yutaka Ishii, Shonan Institute of Technology, Department of Mechanical Engineering, Fujisawa, Kanagawa, 251-8511, Japan; Masaaki Tabuchi and Hiromichi Hongo, National Institute for Materials Science, Tsukuba, Ibaraki, 305-0047, Japan; Masahiko Hirao, Osaka University, Graduate school of Engineering Science, Toyonaka, Osaka, 560-8531, Japan

12:10 PM **Lunch**

SESSION 9

UT FUNDAMENTALS AND COMPOSITES

Joseph Turner and Robert Grandin, Chairpersons
Nicollet D3

8:30 AM **Effect of Surface Irregularity of Defects: Experiment and Computational Modeling**
---Jeong K. Na[2], Shaun Freed[2] and **James L. Blackshire**[1], [1]Air Force Research Lab (AFRL/RXCA), Wright-Patterson AFB, OH 45433; [2]Wyle Laboratories Inc., Advanced Technologies, Dayton, OH 45440

8:50 AM **High Performance Ultrasonic Field Simulation on Complex Geometries**
---Hamza Chouh[1], Gilles Rougeron[1], **Sylvain Chatillon[1] (presented by Vincent Dorval)**, Jean-Claude Lehl[2], Jean-Philippe Farrugi[2], and Victor Ostromoukhov[2], [1]CEA LIST, CEA Saclay – Digiteo Labs, PC 120, 91 191 Gif-Sur-Yvette Cedex, France; [2]LIRIS, UMR 5205, Univ. Lyon I, Team R3AM, Bât. Nautibus, 43 bd du 11 Novembre 1918, 69 622 Villeurbane, Cedex, France

9:10 AM **High Order Nystrom Method for Elastodynamic Scattering**
---Kun Chen, Praveen Gurrala, **Jiming Song**, and Ronald Roberts, Iowa State University, 2130 Coover Hall, Ames, IA 50011

9:30 AM **Simulating UT Measurements from Bolthole Cracks**
---**Robert Grandin,** Tim Gray, and Ron Roberts, Iowa State University, Center for Nondestructive Evaluation, Applied Sciences Complex II, 1915 Scholl Road, Ames, IA 50011

9:50 AM **Stochastic Elastic Wave Scattering From 2D and 3D Random Rough Surfaces Using the Analytical Kirchhoff Theory**
---**Fan Shi**[1], Michael J. S. Lowe[1], Elizabeth Skelton[2], and Richard Craster[2], [1]Department of Mechanical Engineering, Imperial College, London SW7 2AZ, United Kingdom; [2]Department of Mathematics, Imperial College, London SW7 2AZ, United Kingdom

10:10 AM ***Break***

10:30 AM **Local Defect Resonance Used in Non-Destructive Testing**
---Wolfgang Adebahr, Igor Solodov, Markus Rahammer, Nikolai Gulnizkij, and **Marc Kreutzbruck**, University of Stuttgart, Institute of Plastics Engineering (IKT), Pfaffenwaldring 32, 70569 Stuttgart, Germany

10:50 AM **Ultrasonic Tracking of Ply Drops in Composite Laminates**
---**Robert A. Smith**, Luke J. Nelson, Martin J. Mienczakowski, and Paul D. Wilcox, Ultrasonics and NDT Group, University of Bristol, BS8 1TR, United Kingdom

11:10 AM **Quantification of Fatigue State in CFRP Using Ultrasonic Birefringence**
---Peter Fey and Marc Kreutzbruck**, Institut fur Kunststofftechnik, University of Stuttgart, Fpaffenwaldring 32, 70569, Stuttgart, Germany**

11:30 AM **In-situ Damage Monitoring and Analysis of Matrix Cracking in Continuous Fiber Reinforced Ceramic Composites**
---**Travis Whitlow**[1], Eric Jones[2], and Craig Przybyla[2], [1]University of Dayton Research Institute, Dayton, OH 45469; [2]Air Force Research Laboratory, WPAFB, OH 45469

11:50 AM **WITHDRAWN - A Generic Hybrid Modelling Tool for Guided Ultrasonic Wave Inspection -**
---**Manoj Reghu**[1,2] and Prabhu Rajagopal[1], [1]Center for Nondestructive Evaluation and Department of Mechanical Engineering, IIT Madras; [2]Defence Research & Development Laboratory (DRDL), Hyderabad, India

12:10 PM ***Lunch***

SESSION 10
6th EAW
Lakeshore A

ADVANCED METHODS
Michele Carboni and John Aldrin, Co-Chairpersons

8:30 AM **CHANGE OF PRESENTER: New Challenges for the Quantification of the NDT Reliability**
---Mato Pavlovic[1], **Christina Müller**[1], and Ulf Ronneteg[2], [1]BAM Federal Institute for Materials Research and Testing, Berlin, Germany; [2]SKB Swedish Nuclear Fuel and Waste Management Co., Oskarshamn, Sweden

9:10 AM **PAUT Inspection of Copper Canister: Structural Attenuation and POD Formulation**
---**A. Gianneo**[1], M. Carboni[1], C. Mueller[2], and U. Ronneteg[3], [1]Dipartimento di Meccanica, Politecnico di Milano, Via La Masa 1, 20156 Milano; [2]BAM, Berlin, Germany; [3]SKB, Oskarshamn Sweden

9:30 AM **Model-based POD Study of Manual Ultrasound Inspection and Sensitivity Analysis Using Metamodel**
---**Guillemette Ribay**, Xavier Artusi, and Frédéric Jenson, CEA LIST Bat 565 PC120, 91191 Gif sur Yvette, France; Christopher Reece, EDF - DIN-CEIDRE, Etudes-ETC, 2 rue Ampère, 93206 Saint Denis, France; Pierre-Emile Lhuillier, Departement MMC, EDF R&D, Sites des Renardieres, 77818 Moret-sur-Loing, France

9:50 AM **POD Evaluation Using Simulation: Progress, Practice and Perspectives**
---**Nicolas Dominguez**, Airbus Group Innovations, Toulouse, France; Frederic Reverdy, CEA-LIST, Toulouse, France

10:10 AM ***Break***

ADVANCED METHODS
Pierre Calmon and Norio Nakagawa, Co-Chairpersons

10:30 AM **Advanced Reliability Methods – A Review**
---**David Forsyth**, TRI/Austin, 9225 Bee Caves road, Austin, TX 78733

11:10 AM **How Much Information Do We Need? A Reflection on the Correct Use of Real Defects in POD Evaluations**
---**Daniel Kanzler**[1] and Christina Müller[1], [1]BAM Federal Institute for Materials Research and Testing, Berlin, Germany

11:30 AM **Improving the Reliability of POD Curves in NDI Methods Using a Bayesian Inversion Approach for Uncertainty Quantification**
---Anis Ben Abdessalem, Frédéric Jenson, **Pierre Calmon**, CEA LIST, 91191 Gif-sur-Yvette, France

11:50 AM **2D Detectability Criteria and Its Implication for Developing a Standard Observer Model for the Human Component of Inspection Modeling**
---**Joe Gray**, Iowa State University, Center for Nondestructive Evaluation, Applied Sciences Complex II, 1915 Scholl Road, Ames, IA 50011

12:10 PM ***Lunch***

SESSION 11
STUDENT POSTERS
1:30 PM – 3:10 PM
Nicollet AB

NOTE: All Posters will be displayed continuously Monday through Thursday in Nicollet AB. During the Tuesday and Thursday afternoon poster sessions, the individual presenters will be on hand to answer questions.

EMAT for Omni-Directional Shear-Horizontal Guided Wave Generation in a Plate
---**Hong Min Seung**, Chung Il Park, and Yoon Young Kim, Seoul National University, School of Mechanical and Aerospace Engineering and Institute of Advanced Machinery and Design, South Korea

Evaluating an SH Wave EMAT System for Pipeline Screening and Extending into Quantitative Defect Measurements
---**M. Clough** and S. Dixon, University of Warwick, Physics Department, Gibbet Hill Road, Coventry CV4 7AL, United Kingdom; M. Fleming and M. Stone, Sonomatic Ltd., Dornoch House, The Links, Birchwood, Warrington, Cheshire, WA3 7PB, United Kingdom

Scattering of High Order Guided Wave Modes Around a Through Thickness Circular Hole
---**Christophe Travaglini**[1], Christophe Bescond[2], Desmartonne Ramos Franca[1], Silvio E. Kruger[2], Martin Viens[1], and Pierre Belanger[1]; [1]Département de Génie Mécanique École de Technologie Supérieure, 1100 rue Notre-Dame Quest, Montréal (Québec), H3C 1K3, Canada; [2]Conseil National de Recherches Canada, 75 boulevard de Mortagne, Boucherville (Québec), J4B 6Y4, Canada

Experimental Characterization of Early-Stage Stress Corrosion Cracking Using Nonlinear Ultrasound
---**Alexander J. Lakocy**, Jin-Yeon Kim, James J. Wall, and Laurence J. Jacobs, 790 Atlantic Drive NW, Mason 2132, Atlanta, GA 30332-0355

TITLE CHANGE: Backscatter Energy Approach to Characterize Microcracking Damage in Concrete Using Fully Contactless UT
---**Suyun Ham,** John S. Popovics, and Michael L. Oelze, The University of Illinois at Urbana-Champaign, 342 Paddock Drive West, Savoy, IL 61874

Guided Waves Propagating a Helical Structure
---**Kousuke Kanda** and Toshihiko Sugiura, Keio University, School of Integrated Design Engineering, 3-14-1 Hiyoshi Kouhokuku Yokohama-city, Kanagawa, Japan

Feature Guided Waves (FGW) in Fiber Reinforced Composite Plates with 90° Transverse Bends
---**X. Yu**[1], P. Manogharan[2], M. Ratassepp[1], Z. Fan[1], and P. Rajagopal[2], [1]Nanyang Technological University, School of Mechanical and Aerospace Engineering, 50 Nanyang Avenue, Singapore 639798; [2]Indian Institute of Technology Madras, Centre for Nondestructive Evaluation and Department of Mechanical Engineering, Chennai-600036, Tamil Nadu, India

SAFE-3D Analysis of a Piezoelectric Transducer to Excite Guided Waves in a Rail Web
---Dineo A. Ramatlo[1,2]**, Philip W. Loveday[1], Craig S. Long[1], and Daniel N. Wilke[2], [1]CSIR Materials Science and Manufacturing; [2]Department of Mechanical and Aeronautical Engineering, University of Pretoria**

Development of Nonlinear Ultrasonic Techniques to Assess Microstructural Damage in 1% Fe-Cu Steel
---**Katherine Scott**[1], Laurence Jacobs[1,2], Jin-Yeon Kim[2], and James Wall[1,3], [1]G.W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology, Atlanta, GA 30332; [2]School of Civil and Environmental Engineering, Georgia Institute of Technology, Atlanta, GA 30332; [3]Electric Power Research Institute, Charlotte, NC 28262

Development of a Low Frequency Shear Horizontal Piezoelectric Transducer for the Generation of Plane SH Waves
---**Guillaume Boivin**, Martin Viens, and Pierre Bélanger, Department of Mechanical Engineering, École de Technologie Supérieure, 1100, rue Notre-Dame Quest, Montréal (Québec), H3C 1K3, Canada

Measurement of Attenuation Coefficients of the Fundamental and Second Harmonic Waves in Water
---**Shuzeng Zhang**[1], Hyunjo Jeong[2], Sungjong Cho[2], and Xiongbing Li[1], [1]Central South University, School of Traffic and Transportation Engineering, Changsha, Hunan, 410075, China; [2]Wonkwang University, Division of Mechanical and Automotive Engineering, Iksan, Jeonbuk 570-749, Republic of Korea

Rapid Lamb Wave-Based Subwavelength Damage Imaging Using the DORT-MUSIC Technique
---**Jiaze He**[1,2] and Fuh-Gwo Yuan[1,2], [1]National Institute of Aerospace, Center for Integrated Structural Health Management, Hampton, VA 23666; [2]North Carolina State University, Department of Mechanical and Aerospace Engineering, Raleigh, NC 27695

Voronoi Based Microstructure Modeling for Elastic Wave Propagation
---**S. Shivaprasad**[1], Krishnan Balasubramaniam[1], and C. V. Krishnamurthy[2], [1]Indian Institute of Technology, Madras, Centre for Non-Destructive Evaluation, Department of Mechanical Engineering, Chennai, India; [2]Indian Institute of Technology, Madras, Department of Physics, Chennai, India

Anomaly Detection in Radiographic Images of Carbon Fiber via Crosshatch Regression
---**Colin Lockard**, Willam. P. Winfree, and Eric Burke, NASA Langley Research Center, Hampton, VA 23681; Almudena Konrad, Mills College, Oakland, CA 94613; Raymond McCollum, Booz Allen Hamilton, Hampton, VA 23681

Learning to Identify Delaminations in Composite Materials Using Convolutional Neural Networks
---**Daniel Sammons**, NASA Langley Research Center, Hampton, VA 23681 and Department of Computer Science, Old Dominion University, Norfolk, VA 23529; William P. Winfree and Eric Burke, NASA Langley Research Center, Hampton, VA 23681

Effect of Fill Conditions on Bulk Wave Scattering from a Through-Hole
---Joseph W. Kummer**, Alexander J. Dawson, Jennifer E. Michaels, and Thomas E. Michaels, Georgia Institute of Technology, School of Electrical and Computer Engineering, Atlanta, GA 30332-0250**

A Study on Dispersion Characteristics of Leaky Rayleigh Wave on the Layered Thin Film Structure by Loading and Stiffness Effect
---**Byung-seok Jo**, Tae-sung Park, Seung-bum Cho, and Ik-keun Park, Seoul National University of Science and Technology(Seoultech), Department of Mechanical and Automotive Engineering, Seoul, Korea

Electromagnetic Non-Destructive Technique for Duplex Stainless Steel Characterization
---**João V. G. Rocha**, Cesar G. Camerini, and Gabriela R. Pereira, Laboratory of Non-Destructive Testing, Corrosion and Welding, Federal University of Rio de Janeiro – RJ, Brazil

Second Harmonic Rayleigh Wave Detection Using a Heterodyne Laser Interferometer
---**Aulon Bajrami**, David Torello, Jin-Yeon Kim, and Laurence J. Jacobs, Georgia Institute of Technology, Atlanta, GA 30318

3D Modelling of Air-Coupled Detection of Nonlinear Rayleigh Surface Waves
---**Matthias P. Uhrig**, Jin-Yeon Kim, and Laurence J. Jacobs, Georgia Institute of Technology, 1059B Terrell St., NW, Atlanta, GA 30318

Finite Element Simulation of Higher Harmonic Rayleigh Wave Generation Due to Interaction with Defects
---**Tobias Oberhardt**, Jin-Yeon Kim, Jianmin Qu, and Laurence J. Jacobs, Georgia Institute of Technology, School of Civil and Environmental Engineering, Atlanta, GA 30318

Precision Measurement of Crack Closure State with Vibrothermography
---**Bryan Schiefelbein**, Ashraf F. Bastawros, and Stephen D. Holland, Iowa State University, Center for Nondestructive Evaluation, Applied Sciences Complex II, 1915 Scholl Road, Ames, IA 50014

Comparison of Ultrasonic Nonlinear Parameters Measured by PZT and $LiNbO_3$ Transducer
---**Jongbeom Kim**[1], Kyoung-Jun Lee[1], Ju-ho Lee[1], and Kyung-Young Jhang[2], [1]Hanyang University, Department of Mechanical Convergence Engineering, Seoul 133-791, Republic of Korea; [2]Hanyang University, School of Mechanical Engineering, Seoul 133-791, Republic of Korea

Volumetric Measurement of Residual Stress Using High Energy X-Ray Diffraction
---**R. Whitesell, A. McKenna**, S. Wendt, and J. Gray, Iowa State Univesity, Center for Nondestructive Evaluation, Applied Sciences Complex II, 1915 Scholl Road, Ames, IA 50011

Ultrasonic Interface Wave Propagation Analysis for the Nuclear Reactor Nozzle Weld
---**Junpil Park**[1], Jaesun Lee[1], Kyung-Young Jhang[2] and Younho Cho[3], [1]Pusan National University, Graduate School, School of Mechanical Engineering, Busan, South Korea, 609-735; [2]Hanyang University, School of Mechanical Engineering, Seoul, South of Korea, 133-791; [3]Pusan National University, School of Mechanical Engineering, Busan, South Korea, 609-735

Optimization of X-ray CT data acquisition for the inversion of material characteristics of fibre reinforced composites
--Christina I. Fraij, Robert A. Smith, Paul D. Wilcox, University of Bristol, Mechanical Engineering, Queen's Building, University Walk, Bristol, BS8 1TR

SESSION 12
NDE IN THE RAILWAY BRANCH
Michele Caboni, Chairperson
Nicollet D1

3:30 PM **NDT of Railway Components Using Induction Thermography**
---**U. Netzelmann**, G. Walle, A. Ehlen, S. Lugin, M. Finckbohner, and S. Bessert, Fraunhofer Institute for Non-destructive Testing IZFP, University, Campus E3 1, Saarbruecken, Germany

3:50 PM **Non-destuctive Testing and Fracture Mechanics**
---Uwe Zerbs**t**[1], Thomas Heckel[1] and **Michele Carboni**[2], [1]BAM – Federal Institute for Materials Research and Testing, Unter den Eichen 87, D-12205 Berlin, Germany; [2]Department of Mechanical Engineering, Politecnico di Milano, Via La Masa 1, 20156 Milano, Italy

4:10 PM **Modern NDT Methods for the Detection of Cracks in Shafts and Hollow Axles**
---Hartmut Hintze[1], Arne Rohrschneider[1], Stefan Bethke[1], and **Thomas Heckel**[2], [1]DB Systemtechnik GmbH, Zerstörungsfreie Prüfung und Prüfsysteme, Brandenburg-Kirchmöser, Germany; [2]BAM, Federal Institute for Materials Research and Testing, Berlin, Germany

4:30 PM **A Machine Vision Assisted System for Fluorescent Magnetic Particle Inspection of Railway Wheelsets**
---**Tao Ma**[1], Zhenguo Sun[1], Wenzeng Zhang[1], and Qiang Chen[1,2], [1]Tsinghua University Department of Mechanical Engineering, Beijing, P. R. China, 100084, [2]Yangtze Delta Region Institute of Tsinghua University, Jiaxing, P. R. China, 314006

4:50 PM **Influence of Resonant Transducer Variations on Long Range Guided Wave Monitoring of Rail Track**
---**Philip W. Loveday** and Craig S. Long, CSIR Material Science and Manufacturing, South Africa

5:10 PM **Development of the Electromagnetic Technology for Broken Rail Detection from a Mobile Platform**
---**Y.A. Plotnickov[1],** A. Raghunathan[2], A.K. Kumar[3], J. Noffsinger[4], J.M. Fries[4], S.J. Ehret[3], T. Frangieh[1], and S. Palaganda[2], **[1]**GE Global Research, Niskayuna, NY, USA; [2]GE Global Research, Bangalore, India, [3]GE Transporation, Erie, PA, USA, [4]GE Transportation, Kansas City, MO USA.

SESSION 13

MICROWAVE, TERAHERTZ, AND INFRARED NDE

Yuri Plotnikov and Thomas Chiou, Co-Chairpersons
Lakeshore C

3:30 PM **WITHDRAWN - Nondestructive Evaluation of Carbon Fiber Reinforced Plastic (FRP) Defects Using Terahertz Time Domain Spectroscopy (THz—TDS)**
---**Qiang Wang**, X. L. Liao, and X. H. Gu, College of Quality and Safety Engineering, China Jiliang University, Hangzhou, 310018, China

3:50 PM **Microwave Accurate Evaluation of Dielectric Coatings on Carbon Composite Structures**
---R. Zoughi, John Gallion, Matthew Horst, and **Mohammad T. Ghasr,** Electrical and Computer Engineering Department, Applied Microwave Nondestructive Testing Laboratory (*amntl*), Missouri University of Science and Technology (S&T), Rolla, MO 65409

4:10 PM **THz Materials Characterization of Mortar Samples with and without Alkali-Silica Reaction (ASR) Gel**
---Ashkan Hashemi, K. M. Donnell, and **R. Zoughi**, Electrical and Computer Engineering Department, Applied Microwave Nondestructive Testing Laboratory (*amntl*), Missouri University of Science and Technology (S&T), Rolla, MO 65409; Olutosin C. Fawole and Massood Tabib-Azar, University of Utah, Electrical and Computer Engineering Department, Salt Lake City, UT 84112

4:30 PM **Application of Terahertz Technology to Agriculture and Life Sciences**
---**C.-P. Thomas Chiou**, Iowa State University, Center for Nondestructive Evaluation, Applied Sciences Complex II, 1915 Scholl Road, Ames, IA 50011-3042

4:50 PM **Evaluation of Uncertainty in Handheld Terahertz Spectroscopy**
---**Josiah Dierken**[2] and Amanda Criner[1], [1]Air Force Research Labs, Materials and Manufacturing Directorate, Wright Patterson AFB OH 45433; [2]Structural Integrity Division, University of Dayton Research Institute, Dayton, OH 45469

5:10 PM **NDE of Composite Structures Using Microwave Time Reversal Imaging**
---**Saptarshi Mukherjee**[1], Antonello Tamburrino[1,2], Lalita Udpa[1] and Satish Udpa[1], [1]Nondestructive Evaluation Laboratory, Michigan State University, MI 48824; [2]DAEIMI, UniversitÃ degli Studi di Cassino V. G. Di Biasio, 43 Cassino 03043, Italy

SESSION 14
EDDY CURRENT I
Dave Utrata, Chairperson
Nicollet D3

3:30 PM **Eddy Current Circuit Design for Power Maximization of an Omnidirectional Magnetostrictive Patch Transducer**
---**Kiyean Kim**, Hyung Jin Lee, Joo Kyung Lee, and Yoon Young Kim, School of Mechanical and Aerospace Engineering and Institute of Advanced Machinery and Design, Seoul National University, Republic of Korea, South Korea

3:50 PM **Characteristics of Remote Field Eddy Current Testing with Shorter Distance between Surface Type Exciting and Detector Coils**
---**Souichi Ueno**, Noriyasu Kobayashi, and Kawajiri Yuko, Toshiba Corporation, 8 Shinsugita-cho, Isogo-ku, Yokohama 235-8523, Japan

4:10 PM **Rotating Current EC-GMR System for Rapid Scanning of Faster Sites**
---Chaofeng Ye, Zhiyi Su, Michael Saybolt, **Yue Huang**, L. Udpa, and S. S. Udpa, Michigan State University, Department of Electrical and Computer Engineering, East Lansing, MI 48824

4:30 PM **Inspection of Steam Generator Tube Support Structures Using Pulsed Eddy Current**
---**P. R. Underhill**[1], S. G. Mokros[1,2], J. Buck[1,2], J. Morelli[2], and T. W. Krause[1], [1]Royal Military College of Canada, Kingston, Ontario, Canada; [2]Queen's University, Kingston, Ontario, Canada

4:50 PM **Applications and Limitations for Using ACPD in Crack Depth Measurements**
---**D. Utrata** and D. Enyart, Iowa State University, Center for Nondestructive Evaluation, Applied Sciences Complex II, 1915 Scholl Road, Ames, IA 50011

SESSION 15
6th EAW
Lakeshore A

APPLICATIONS IN INDUSTRY
Martin Spies and Lloyd Schaefer, Co-Chairpersons

1:30 PM **Overview of the Program to Assess the Reliability of Emerging Nondestructive Techniques Open Testing and Study of Flaw Type Effect on NDE Response**
---**Ryan M. Meyer**, Susan Crawford, and Michael T. Anderson, Pacific Northwest National Laboratory, Rihland, WA 99352; Tommy Zetterwall, Swedish Qualification Center, Täby, Sweden; Ichiro Komura, Japan Power Engineering and Inspection Corporation, Yokohama, Japan; Kyung-cho Kim, Korea Institute of Nuclear Safety, Daejeon, South Korea; Iouri Prokofiev and Stephen C. Cumblidge, Nuclear Regulatory Commission, Washington D.C.

2:10 PM **CHANGED TO 40 MINUTE LENGTH - Integration of Reliability Studies in the Development of NDT for the Swedish Spent Nuclear Fuel Disposal Canister**
---**Ulf Ronneteg**[1], Marija Bertovic[2], Mato Pavlovic[2], and Thomas Grybäck[1]; [1]SKB, Swedish Nuclear Fuel and Waste Management Co., Oskarshamn, Sweden; [2]DGZfP Ausbildung und Training GmbH

2:30 PM **WITHDRAWN - Influence on the POD by the Scanning Raster**
---**Thomas Heckel**, BAM Bundesanstalt fur Materialforschung und -prufung, FG 8.4, Berlin 12205, Germany; Johannes Vrana, Marcel Preiβel, DGZfP

2:50 PM **POD Curves for Non-Maximizable Ultrasonic Responses: Statistical Derivation and Application to Solid Freight Axles**
---**M. Carboni**[1] and S. Cantini[2], [1]Department of Mechanical Engineering, Politecnico di Milano, Via La Masa 1, 20156 Milano; [2]Lucchini RS SpA, Via G. Paglia 45, 24065 Lovere (BG)

3:10 PM ***Break***

APPLICATIONS IN INDUSTRY
Stephen Cumblidge and Daniel Kanzler, Co-Chairpersons

3:30 PM **CHANGED TO 60 MINUTE LENGTH - Optimization of Sensitivity Overheads for Pipe End Inspection via POD-Analysis**
---Thomas Orth and Till Schmitte, Salzgitter-Mannesmann Forschung GmbH, Ehingerstrasse 200, 47259 Duisburg, Germany; **Martin Spies**, Fraunhofer-Institut for Nondestruction Testing IZFP, Campus E3 1, 66123 Saarbrücken, Germany; Thomas Kersting, Europipe GmbH – Werk Mülheim, Wiesenstraße 36, 35473 Mülheim an der Ruhr, Germany

3:50 PM **WITHDRAWN - Measuring the Reliability of Magnetic Particle Inspections as Applied to the API and ASME Codes for Use on Aging Infrastructure**
---**L. Schaefer**, Sr. Advising Engineer, Pacific Gas & Electric Company, Applied Technology Services, 2400 Crow Canyon Road, San Ramon, CA 94583

4:10 PM **WITHDRAWN - Assessment of ASTM Adopted and Proposed Hit/Miss and A-hat vs. a Documents against Handbook/guideline 1823 Recommendations**
---**L. Schaefer**, Sr. Advising Engineer, Pacific Gas & Electric Company, Applied Technology Services, 2400 Crow Canyon Road, San Ramon, CA 94583

4:50 PM **Assessment of Reliability of Remote Visual Testing**
---**Pradeep Ramuhalli**[1], Jeffrey Landrum[2], Michael Anderson[1], Chris Joffe[2], John Lindberg[2], Matt Prowant[1], Mike Larche[1], Traci Moran[1], [1]Pacific Northwest National Laboratory, Richland, WA 99352; [2]Electric Power Research Institute, Charlotte, NC 28262

5:10 PM **Partial Coverage Inspection Using Extreme Value Theory on Ultrasonic C-scan Data**
---**Daniel Benstock** and Frederic Cegla, Imperial College London, NDE Group, Department of Mechanical Engineering, Exhibition Road, London, SW7 2AZ, United Kingdom

SESSION 16
COMPOSITES I
Michael Lowe and Dan Barnard, Chairpersons
Nicollet D2

3:30 PM **Improved FE Simulation of Ultrasound in Plastics**
---**J. S. Egerton**[1], M. J. S. Lowe[1], and P. Huthwaite[1], [1]Imperial College London, Exhibition Road, London SW7 2AZ, United Kingdom; H. V. Halai[2], [2]EDF Energy Nuclear Generation Ltd., London SW7 2AZ, United Kingdom

3:50 PM **High Contrast Ultrasonic Imaging of Resin-Rich Regions in Graphite/Epoxy Composites Using Entropy**
---**Michael S. Hughes**[1], John E. McCarthy[2], Jon N. Marsh[2], and Samuel A. Wickline[2], [1]Pacific Northwest National Laboratory, Richland, WA 99354; [2] Washington University in Saint Louis, Saint Louis, MO, 63130

4:10 PM **A 2-D Areal Scan for Imaging Composite Damage Using an Enhanced CCRTM Technique**
---**Jiaze He**[1,2], Fuh-Gwo Yuan[1,2], [1]Center for Integrated Structural Health Management, National Institute of Aerospace, Hampton, VA 23666; [2]Department of Mechanical and Aerospace Engineering, North Carolina State University, Raleigh, NC 27695

4:30 PM **The Effects of Experimental Configuration on the Efficacy of Coda Wave Interferometry for the Measurement of Thermally Induced Ultrasonic Velocity Variations in CFRP Laminates**
---**Richard Livings**[1,2], Vinay Dayal[1,2], and Dan Barnard[2], [1]Department of Aerospace Engineering and [2]Center for Nondestructive Evaluation, Iowa State University, Ames IA 50011

4:50 PM **Novel Self-Sensing Carbon Nanotube-Based Composites for Rehabilitation of Structural Steel Members**
---**Shafique Ahmed**[1,4], Sagar Doshi[2,4], Thomas Schumacher[1,4], Erik T. Thostenson[2,3,4], Jennifer McConnell[1,4], [1]Department of Civil and Environmental Engineering; [2]Department of Mechanical Engineering; [3]Department of Materials Science Engineering; [4]Center for Composite Materials University of Delaware; Newark, Delaware 19716

SESSION 17

ULTRASONIC ARRAYS I

Bob Addison and Paul Wilcox, Co-Chairpersons
Nicollet D1

8:30 AM **Plane Wave Imaging for Ultrasonic Inspection of Irregular Structures with High Frame Rates**
---Léonard Le Jeune[1], **Sébastien Robert[1]**, and Claire Prada[2], [1]CEA LIST, 91191 Gif-sur-Yvette, France: [2]Institut Langevin, 1 rue Jussieu, 75238 Paris Cedex, France

8:50 AM **Fast Total Focusing Method for Ultrasonic Imaging**
---Ewen Carcreff[1], Gavin Dao[2], and **Dominique Braconnier**[1], [1]The Phased Array Company, 9078 Union Centre Blvd. suite 350, West Chester, OH 45069; [2]Advanced OEM Solutions, 8044 Montgomery Rd. 700, Cincinnati, OH 45236

9:10 AM **Imaging Beyond Aliasing**
---**Arno Volker** and Paul van Neer, Stieltjesweg 1, P. O. Box 155, 2600 AD Delft, The Netherlands

9:30 AM **Near Surface Imaging Using Diffuse Field Full Matrix Capture**
---**Jack Potter**, Paul D. Wilcox, and Anthony J. Croxford, University of Bristol, Department of Mechanical Engineering, Queen's Building, University Walk, Bristol BS8 1TR, United Kingdom

9:50 AM **A Novel Serrated Columnar Phased Array Ultrasonic Transducer**
---**Cheng Zou**, Zhenguo Sun, Dong Cai, Hongwei Song, and Qiang Chen, Tsinghua University, Department of Mechanical Engineering, Beijing 100084, China

10:10 AM ***Break***

10:30 AM **Investigation into Angular and Frequency Dependence of Scattering Matrices of Elastodynamic Scatterers**
---**Jie Zhang**[1], Maria Felice[1], Alexander Velichko[1], and Paul D. Wilcox[1]; [1]Department of Mechanical Engineering, University Walk, University of Bristol, Bristol BS8 1TR, United Kingdom

10:50 AM **Multiple Scattering Filter: Application to the Plane Defect Detection in a Nickel Alloy Media**
---**Camille Trottier**[1], Sharfine Shahjahan[1], Andreas Schumm[1], Alexandre Aubry[2], and Arnaud Derode[2], [1]EDF R&D – EDF-Lab les Renardieres 77818 Moret sur Loing, France; [2]Institut Langevin – 1 rue Jussieu 75005 paris, France

11:10 AM **Optimal Matched Filter Design for Ultrasonic NDE of Coarse Grain Materials**
---**Minghui Li**[1] and Gordon Hayward[2], [1]School of Engineering, University of Glasgow, Glasgow G12 8QQ, United Kingdom; [2]Centre for Ultrasonic Engineering, University of Strathclyde, Glasgow G1 1XW, United Kingdom

11:30 AM **Finite Element Analysis for Ultrasonic NDE Inspections of Heterogeneous Materials**
---**Jeff Dobson**, Anthony Gachagan, Richard O'Leary, Anthony Mulholland, and Katherine Tant, University of Strathclyde, Centre for Ultrasonic Engineering, Department of Electronic and Electrical Engineering, Glasgow, United Kingdom; Andrew Tweedie and Gerald Harvey, Weidlinger Associates Ltd., Glasgow, United Kingdom

11:50 AM **PAUT Inspection of Copper Canister: Structural Attenuation and POD Formulation**
---A. Gianneo1, M. Carboni1, C. Mueller2, and U. Ronneteg3; 1Dipartimento di Meccanica, ***Politecnico di Milano, Via La Masa 1, 20156 Milano, [2]BAM, Berlin, Germany; [3]SKB, Oskarshamn, Sweden***

12:10 PM ***Lunch***

SESSION 18

NDE of COMPOSITES II (EXPERIMENTAL)

Mahmood Haq and Lalita Udpa, Co-Chairpersons
Nicollet D2

8:30 AM **Air Force Activities Driving NDE of Composites**
---**Sean Coghlan**, U.S. Air Force Research Laboratory, Wright-Patterson AFB, OH 45433

8:50 AM **Monitoring of Fatigue Damage in Prestressed Composite Lap-Joints Using Guided Waves and FBG Sensors**
---**Oleksii Karpenko**[1], Anton Khomenko[2], Ermias Koricho[2], Mahmoodul Haq[2,3], and Lalita Udpa[1], [1]Department of Electrical and Computer Engineering, Michigan State University, East Lansing, MI 48864; [2]Composite Vehicle Research Center, 2727 Alliance Drive, Lansing, MI 48910, [3]Department of Civil and Environmental Engineering, Michigan State University, East Lansing, MI 48864

9:10 AM **Fast and Broadband Numerical Models for Electromagnetic NDE of Composite Materials**
---**A. Tamburrino**, DIEI, Università degli Studi di Cassino e del Lazio Meridionale, Cassino, 03043, Italy and Michigan State University, East Lansing, MI 48864; C. Forestiere and G. Rubinacci, DIEL, Università di Napoli Federico II, Napoli, 80125, Italy; S. Ventre, DIEI, Università degli Studi di Cassino e del Lazio Meridionale, Cassino, 03043, Italy; C. Ye, L. Udpa, and S. Udpa, Michigan State University, East Lansing, MI 48864

9:30 AM **Design and Demonstration of Automated Data Analysis Algorithms for Ultrasonic Inspection of Complex Composite Panels with Bond**
---**John C. Aldrin**, Computational Tools, Gurnee, IL 60031; David S. Forsyth, TRI/Austin, Austin, TX 78746; John T. Welter, Air Force Research Laboratory, Wright-Patterson AFB, OH 45433

9:50 AM **Investigation of Ultrasonic Flux Imaging for Damage Detection in Polymer Composites**
---**J. T. Welter**[1], R. W. Martin[2], R. Mooers[1], R. Reibel[2], T. R. Boehnlein[2], and S. Sathish[2], [1]Air Force Research Laboratory (AFRL/RXCA), Wright-Patterson AFB OH 45433; [2]University of Dayton Research Institute, 300 College Park, Dayton, OH 45469-0127

10:10 AM ***Break***

10:30 AM **Ultrasonic Testing of Composites in the Aircraft Industry**
---**Nicolas Dominguez**, Silvère Barut, and Frank Guibert, Airbus Group Innovations, Toulouse, France; Romain Ecault, TESTIA France, Airbus Group, Toulouse, France

10:50 AM **Accurate Microwave Thickness Evaluation of Liner and Structural Wall Thickness in Fiberglass Composite Structures**
---Mohammad T. Ghasr, Matthew J. Horst, and **R. Zoughi**, Electrical and Computer Engineering Department, Applied Microwave Nondestructive Testing Laboratory (*amntl*), Missouri University of Science and Technology (S&T), Rolla, MO 65409; Mario Lechuga, R. Rapoza, and C. Renoud, Fiberglass Structural Engineering (FSE), Inc., Bellingham, WA 98226

11:10 AM **Evaluation of Fatigue Damage Accumulation in Composites via Linear and Nonlinear Guided Waves Methods**
---**Jinling Zhao**[1,2], Vamshi Chillara[2], Hwanjeong Cho[2], Jinhao Qiu[1], and Cliff Lissenden[2], [1]State Key Laboratory of Mechanics and Control of Mechanical Structures, Nanjing University of Aeronautics and Astronautics, Nanjing, Jiangsu 210016, China; [2]Department of Engineering Science and Mechanics, Penn State, University Park, PA 16802

11:30 AM **Acoustic Characterization of Void Distributions Across Carbon-Fibre Composite Layers**
---**Rostand B. Tayong**[1], Robert A. Smith[1], and Valerie J. Pinfield[2], [1]Department of Mechanical Engineering, University of Bristol, University walk, Bristol BS81TR, United Kingdom; [2]Chemical Engineering Department, Loughborough University, Loughborough, Leics. United Kingdom

12:10 PM ***Lunch***

SESSION 19

NDE AND NDT SYSTEMS AND CIVIL ENGINEERING MATERIALS

Dwight Clayton and Kyle Hoegh, Chairpersons
Nicollet D3

8:30 AM **Improved SAFT Results of Thick Concrete Specimens Through Frequency Banding**
---**Dwight Clayton**, Alan Barker, Austin Albright, and Hector Santos-Villalobos, Oak Ridge National Laboratory, P. O. Box 2008, MS6174, Oak Ridge, TN 37831-6174

8:50 AM **Development of Acoustic Model-Based Iterative Reconstruction Technique for Thick Concrete Imaging**
---Hani Almansouri[1], Dwight Clayton[2], Roger Kisner[2], Yarom Polsky[2], Charles Bouman[1], and **Hector Santos-Villalobos**[2], [1]Purdue University; [2]Oak Ridge National Laboratory, One Bethel Valley Road, Oak Ridge, TN 37831-6075

9:10 AM **Inspection of a Thick Concrete Block Containing Embedded Defects Using Ground Penetrating Radar**
---**David Eisenmann**, Frank Margetan, and Lucas Koester, Iowa State University, Center for Nondestructive Evaluation,1915 Scholl Road, Ames, IA 50011; Dwight Clayton, Oak Ridge National Laboratory, One Bethel Valley Road, Oak Ridge, TN 37831-6174

9:30 AM **Classification of Alkali-Silica Reaction Distress Using Acoustic Emission**
---Mohamed ElBatanouny[2], Rafal Anay[1], Marwa Abdelrahman[1], Jeremiah Fasl[2], Carl Larosche[2], and **Paul Ziehl**[1], [1]Department of Civil and Environmental Engineering, University of South Carolina, Columbia, SC 29208; [2]Wiss, Janney, Elstner Associates, Inc., Austin, TX

9:50 AM **Percolation Models of Alkali Silica Reaction in Concrete Structures**
---**Andrei V. Gribok**[1], Vivek Agarwal[1], and Guowei Cai[2], [1]Department of Human Factors, Controls, and Statistics, Idaho National Laboratory, Idaho Falls, ID 83415; [2]Department of Civil and Environmental Engineering, Vanderbilt University, Nashville, TN 37235

10:10 AM ***Break***

10:30 AM **Effects of Material Properties on Linear and Nonlinear Vibration Responses of Cement and Concrete**
---**John S. Popovics**[1], Jesus N. Eiras[2], and Jeevaka I. Somaratna[1], [1]The University of Illinois at Urbana-Champaign, Urbana, IL 61801; [2]Instituto de Ciencia y Tecnología del Hormigón (ICITECH), Universitat Politècnica de València, 46022 Camino Vera s/n, València, Spain

10:50 AM **Damage Characterization in Concrete Using Nonlinear Surface Acoustic Waves: Detection of Inherent Defects and Microscale Alterations Due to Environmental Interaction**
---**Gun Kim**[1], Jin-Yeon Kim[1], Kimberly E. Kurtis[1], and Laurence J. Jacobs[1,2]; [1]Georgia Institute of Technology, School of Civil and Environmental Engineering, Atlanta, GA 30332-0355; [2]Georgia Institute of Technology, GW Woodruff School of Mechanical Engineering, Atlanta, GA 30332

11:10 AM **WITHDRAWN - Multi-Resolution Analysis and Reconstruction of Ultrasonic Signals**
---**Vivek Agarwal** and Andrei V. Gribok, Idaho National Laboratory, Department of Human Factors, Controls, and Statistics, Idaho Falls, ID

11:30 AM **Damage Detection of Wind Turbine Blades Using a Root Based Network of Thin Film Sensors**
---**Austin Downey**[1,2] and Simon Laflamme[1,3]; [1]Department of Civil, Construction, and Environmental Engineering, Iowa State University, Ames, IA, 50011; [2]Department of Wind Energy Science Engineering and Policy, Iowa State University, Ames, IA, 50011; [3]Department of Electrical and Computer Engineering, Iowa State University, Ames, IA, 50011

11:50 AM **A Pipe Inspection System by a Guidewave Using a Long Distance Waveguide**
---**Riichi Murayama**, Kenshi Matsymoto, and Kenji Ushitani, Faculty of Engineering, Fukuoka Institute of Technology, 3-30-1 Wazirohigashi, Higashi, Fukuoka, 811-0295 Japan; Makiko Kobayashi, Faculty of Engineering, Kumamoto University, 2-40-1 Kurokami Chuo-ku, Kumamoto City, 860-8555 Japan

12:10 PM ***Lunch***

SESSION 20
SIGNAL PROCESSING AND NEW TECHNIQUES
Aleksander Dogandzic, Chairperson
Lakeshore C

8:30 AM **Enhancing Pulsed Eddy Current for Inspection of P-3 Orion Lap-Joint Structures**
---**D. M. Butt**[1], P. R. Underhill[2] and T. W. Krause[2], [1]Department of Chemistry and Chemical Engineering, Royal Military College of Canada, Kingston ON K7K 7B4, Canada; [2]Department of Physics, Royal Military College of Canada, Kingston ON K7K 7B4, Canada

8:50 AM **A Model-Based Change Index for Damage Mapping**
---V. John Mathews**, Joel Harley**, University of Utah, Department of Electrical & Computer Engineering, Salt Lake City, UT 84112-9206

9:10 AM **Evaluation and Reconstruction of Wave Features in Wind-Driven Water Film Flow Using Ultrasonic Pulse-Echo Technique**
---**Yang Liu**[1], Leonard J. Bond[1,2], and Hui Hu[1], [1]Iowa State University, Department of Aerospace Engineering, 2271 Howe Hall, Room 1200, Ames, IA 50011; [2]Iowa State University, Center for Nondestructive Evaluation, 1915 Scholl Road, 151 ASC II, Ames, IA 50011

9:30 AM **Ensemble of Classifiers for Confidence-Rated Classification of NDE Signal**
---**Portia Banerjee**, Seyed Safdarnejad, Lalita Udpa, and Satish Udpa, Michigan State University, Non Destructive Evaluation Laboratory, Department of Electrical and Computer Engineering, East Lansing, MI 48824

9:50 AM **A Robust Multi-frequency Mixing Algorithm for Suppression of Rivet Signal in GMR Inspection of Riveted Structures**
---S. Safdarnejad, **O. Karpenko**, L. Udpa, and S. S. Udpa, Michigan State University, Electrical and Computer Engineering Department, East Lansing, MI 48824

10:10 AM ***Break***

10:30 AM **Modeling of Ultrasonic Guided Waves for Circular Cylindrical Structures Using Finite Element Approach and Selection of Noise Filtering Technique**
---**Ambuj Sharma**[1], Mayank Nirbhay[2], and Amit Tyagi[1]; [1]Mechanical Engineering Department, IIT (BHU) Varanasi-221005, India; [2]Deparatment of Mechanical Engineering, GBU, Greater Noida-201308, India

10:50 AM **Application of Temporal Moments and Other Signal Processing Algorithms to Analysis of Ultrasonic Signals through Melting Wax**
---**Sarah Lau**, David Moore, and Ciji Nelson, Sandia National Laboratories, Albuquerque, NM 87123

11:10 AM **Stress Dependence of the Hall Coefficient of a Nickel-Base Superally**
---**Daigo Kosaka**, Anatoli Frishman, and Norio Nakagawa, Iowa State University,Center for Nondestructive Evaluation, Applied Sciences Complex II, 1915 Scholl Road, Ames, IA 50011

11:30 AM **Experimental Study the Acoustoelastic Lamb Wave in Thin Plates**
---**Ning Pei** and Leonard J. Bond, Iowa State University, Center for Nondestructive Evaluation, Applied Sciences Complex II, 1915 Scholl Road, Ames, IA 50011-3041

11:50 AM **The Influence of Ultrasonic Frequency on Stress Measurement Using Acoustoelasticity**
---**Zeynab Abbasi**[1] and Didem Ozevin[1], [1]University of Illinois at Chicago, Civil and Materials Engineering, 842 W. Taylor Street ERF 2095, Chicago, IL 60607

12:10 PM ***Lunch***

SESSION 21

6th EAW

Lakeshore A

HUMAN AND ORGANIZATIONAL FACTORS
Ralf Holstein and Greg Selby, Co-Chairpersons

8:30 AM **Safety and Organizational Culture in NDT Matter**
---Babette Fahlbruch[1] and **Marija Bertovic**[2], [1]TUV NORD Systems, Zimmerstr. 23, 10969 Berlin; [2]DGZfP Ausbildung and Training GmbH

8:50 AM **Basic Considerations about Reliability in Testing Railway Axles**
---**Ralf Holstein**[1], Marija Bertovic[1], and Christina Müller[2], [1]DGZfP Ausbildung und Training, GmbH, Berlin, Germany; [2]BAM Federal Institute for Materials Research and Testing, Berlin, Germany

9:10 AM **Inspection Procedure in the Context of the Usability Framework – Human Factors Approach**
---**Marija Bertovic**[1] and Ulf Ronneteg[2], [1]DGZfP Ausbildung und Training GmbH; Berlin, [2]SKB, Swedish Nuclear Fuel and Waste Management Co; Oskarshamn, Sweden

9:30 AM **Predicting Inspector Probability of Detection Using Qualification Test Pass Rates**
---**Stephen Cumblidge**, US Nuclear Regulatory Commission, Mail Stop OWFN/9 H6, Washington, DC 20555-0001

9:50 AM **MOVED TO 9:50 AM - CHANGE OF PRESENTER - Influencing Factors on the Inspection Performance of Wheel Axle Sets Under Training Conditions**
--- **Ralf Holstein**, Thomas Heckel, et al., BAM Bundesanstalt fur Materialforschung und -prufung, FG 8.4, Berlin 12205

WITHDRAWN - Reliability Assessment of Manual and Automated Eddy Current Techniques in the Inspection of Martensitic Stainless Steel Components
---**Hamid Habibzadeah Boukani**[1], Ehsan Mohseni[1], Demartonne Ramos Franca[1], and Martin Viens[1], [1]Départment de genie mécanique, L'École de technologie Supérieure, Montréal, Québec, Canada

10:10 AM ***Break***

10:30 AM **MOVED TO 9:50 AM - CHANGE OF PRESENTER - Influencing Factors on the Inspection Performance of Wheel Axle Sets Under Training Conditions**
--- **Ralf Holstein**, Thomas Heckel, et al., BAM Bundesanstalt fur Materialforschung und -prufung, FG 8.4, Berlin 12205

OPEN SPACE TECHNOLOGY WORKSHOP
Ralf Holstein and Greg Selby, Co-Chairpersons

10:50 AM **Introduction to the Open Conception, Ralf Holstein**

11:10 AM **Results from 2013**

11:30 AM **Structuring of Topic Fields According to the "Wall of Ideas"**
Preliminary Proposal for Topic Fields:

Group 1: New Methods
David Forsyth and Daniel Kanzler

Group 2: Human Factors
Marija Bertovic and Ralf Holstein

Group 3: SHM
Eric Lindgren

Group 4: Industrial Applications
Lloyd Schafer

Group 5: Integrated Solutions
Ulf Ronneteg and Stephen Cumblidge

12:10 PM ***Lunch***

SESSION 22
ULTRASONIC ARRAYS II
Bob Addison and Paul Wilcox, Co-Chairpersons
Nicollet D1

1:30 PM **Optimization of Element Length in Linear Ultrasonic Arrays for Improved Detectability of Defects**
---**T. S. Barber**[1, 2], P. D. Wilcox[1], and A. D. Nixon[2]; [1]University of Bristol, Mechanical Engineering, Queens Building, University Walk, Bristol, BS8 1TR, United Kingdom; [2]BAE Systems Submarines, Materials Technology, Barrow-in-Furness, Cumbria, LA14 1AF, United Kingdom

1:50 PM **Rapid Lamb Wave-Based Subwavelength Damage Imaging Using the DORT-MUSIC Technique**
---**Jiaze He**[1,2] and Fuh-Gwo Yuan[1,2], [1]Center for Integrated Structural Health Management, National Institute of Aerospace, Hampton, VA 23666; [2]Department of Mechanical and Aerospace Engineering, North Carolina State University, Raleigh, NC 27695

2:10 PM **Crack Length Measurements by Subharmonic Phased Array for Crack Evaluation with Surface Acoustic Wave with Water Immersion**
---**Yoshikazu Ohara**, Akihiro Ouchi, Juri Saito, and Kazushi Yamanaka, Tohoku University, Department of Materials Processing, Sendai, 980-8579, Japan

2:30 PM **Frequency Domain Ultrasound Imaging for Frequency Selective Nonlinear Sub-Harmonic Phased Array Imaging**
---**Choon-Su Park**, Jun-woo Kim, Seunghyun Cho, and Dae-Cheol Seo, Korea Research Institute of Standards and Science, Yuseong-gu, Daejeon, South Korea

2:50 PM **OPEN**

3:10 PM ***Break***

NON-LINEAR
Christopher Kube and Daniel Barnard, Chairpersons

3:30 PM **Measurement of Nonlinearity Parameter (B) of Water Using Commercial Immersion Transducer**
---Daniel J. Barnard and **Sunil Kishore Chakrapani**, Iowa State University, Center for Nondestructive Evaluation, Applied Sciences Complex II, 1915 Scholl Road, Ames IA 50011

3:50 PM **Time-Domain Analysis of Resonant Acoustic Nonlinearity Arising from Cracks in Multilayer Ceramic Capacitors**
---**Ward L. Johnson**, Sudook A. Kim, and Grady S. White, National Institute of Standards and Technology, 325 Broadway St., MS 647, Boulder, CO 80305; Jaemi Herzberger, University of Maryland, Department of Mechanical Engineering, College Park, MD 20742

4:10 PM **A Novel and Practical Approach for Determination of the Acoustic Nonlinearity Parameter Using a Pulse-Echo Method**
---**Hyunjo Jeong**[1], Shuzeng Zhang[2], Sungjong Cho[1], Xiongbing Li[2], and Dan Barnard[3], [1]Division of Mechanical and Automotive Engineering, Wonkwang University, Iksan, Jeonbuk 570-749, Republic of Korea; [2]School of Traffic and Transportation Engineering, Central South University, Changsha, Hunan, 410075, China; [3]Center for Nondestructive Evaluation, Iowa State University, Ames, IA 5001

4:30 PM **Experimental Comparison of Nonlinear Parameters Obtained from Absolute Measurement and Relative Measurement**
---**Jongbeom Kim**[1], Dong-Gi Song[1], Younho Cho[2], Chung-Seok Kim[3], and Kyung-Young Jhang[4],[1]Department of Mechanical Convergence Engineering, Hanyang University, Seoul, Republic of Korea, 133-791; [2]School of Mechanical Engineering, Pusan National University, Busan, South Korea, 609-735; [3]Department of Metallurgy and Materials Engineering, Chosun University, Gwangju, Republic of Korea, 501-759; [4]School of Mechanical Engineering, Hanyang University, Seoul, Republic of Korea, 133-791

1

4:50 PM

SESSION 23
NDE MODELING OF COMPOSITES
Cara Leckey, Chairperson
Nicollet D2

1:30 PM **Nondestructive Evaluation of Composites – Current AFRL Activities**
---**Eric Lindgren**, John Welter, David Mollenhauer, and Mark Flores, US Air Force Research Laboratory, Materials and Manufacturing Directorate, Structural Materials Division, WP AFB OH 45433

1:50 PM **Advances in Electromagnetic Models for Three-Dimensional Nondestructive Evaluation of Advanced Composites**
---**Harold A. Sabbagh**, R. Kim Murphy, and Elias H. Sabbagh, Victor Technologies, LLC, P. O. Box 7706, Bloomington, IN 47407-7706

2:10 PM **A Model-Based, Bayesian Characterization of Subsurface Corrosion Parameters in Composite Multi-Layered Structures**
---**Heather Reed**, Weidlinger Associates, Inc., New York, NY 10005; Wally Hoppe, University of Dayton Research Institute, Dayton, OH 45469

2:30 PM **Estimating Composite Material Condition Using Limited NDE Data and Bayesian Inference**
---**Elizabeth Gregory** and Stephen D. Holland, Center for Nondestructive Evaluation and Department of Aerospace Engineering, Iowa State University, Ames, IA 50011

2:50 PM **Validation and Implementation of an Automated Data Analysis Algorithm**
---**J. T. Welter**[1], J. C. Aldrin[2], and D. Forsyth[3], [1]Air Force Research Laboratory (AFRL/RXCA), Wright-Patterson AFB OH 45433; [2]Computational Tools, Gurnee IL 60031; [3]TRI/Austin, Austin, TX 78746

3:10 PM ***Break***

3:30 PM **Challenges of Composite NDE Simulation Tool Development and Validation**
---**Cara A. C. Leckey**[1], Peter D. Juarez[1], and Jeffrey P. Seebo[2], [1]NASA Langley Research Center, Hampton VA 23681; [2]Analytical Mechanics Associates, Inc., Hampton VA 23681

3:50 PM **Numerical Simulations of Thermographic Responses in Composites**
---William P. Winfree, **K. Elliott Cramer**, Joseph N. Zalameda, and Patricia A. Howell, NASA Langley Research Center, Mail Stop 225, 5 West Taylor Street, Hampton, VA 23681

4:10 PM **3D Finite Element Modelling of Guided Wave Scattering at Delaminations in Composites**
---Bibi Intan Suraya Murat and **Paul Fromme**, University College London, Department of Mechanical Engineering, WC1E 7JE, United Kingdom

4:30 PM **Dispersion Loci of Guided Waves in Viscoelastic Composites of General Anisotropy**
---**F. Hernando Quintanilla**[1], Z. Fan[2], M. J. S. Lowe[1], and R. V. Craster[3]; [1]Department of Mechanical Engineering, Imperial College, London SW7 2AZ, United Kingdom; [2]School of Mechanical and Aerospace Engineering, Nanyang Technological University, 50 Nanyang Avenue, Singapore 639798; [3]Department of Mathematics, Imperial College, London SW7 2AZ, United Kingdom

4:50 PM **Guided Wavefield Reconstruction from Sparse Measurements**
---**Olivier Mesnil**[1] and Massimo Ruzzene[1,2], [1]D. Guggenheim School of Aerospace Engineering, Georgia Institute of Technology, Atlanta, GA 30332-0150; [2]G. W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology, Altanta, GA 30332-0150

5:10 PM **Phase Congruency for Damage Mapping in Composites**
---**Aaron Darnton**, George W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology and Naval Undersea Warfare Center, Division Keyport, Atlanta, GA 30332-0150; Massimo Ruzzene, Daniel Guggenheim School of Aerospace Engineering and George W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology, Atlanta, GA 30332-0150

SESSION 24
ONE-SIDED ACCESS FOR CIVIL INFRASTRUCTURE CHARACTERIZATION
Dwight Clayton and Kyle Hoegh, Co-Chairperson
Nicollet D3

1:30 PM **Quantitative Ultrasonic Evaluation of Concrete Structures Using One-Sided Access**
---**Lev Khazanovich** and Kyle Hoegh, University of Minnesota, Department of Civil, Environmental and Geo- Engineering, Minneapolis, MN 55455

2:10 PM **TITLE CHANGE: Contactless UT Backscatter Energy Approach to Characterize Cracking Damage in Concrete**
---**Suyun Ham**, John S. Popovics, and Michael L. Oelze, The University of Illinois at Urbana-Champaign, 205 N. Mathews Street, MC-250, Urbana, IL 61801

2:30 PM **Optimizing Data Collection Settings for Ultrasonic Evaluation of Defects in Diverse Environments**
---**Kyle Hoegh**[1], Lev Khazanovich[1], and Dwight Clayton[2]; [1]Department of Civil, Environmental and Geo- Engineering, University of Minnesota, Minneapolis, MN 55455; [2]Oak Ridge National Laboratory, Electrical and Electronics Systems Research Division, P. O. Box 2008 Oak Ridge, TN 37831

2:50 PM **Imaging and Characterization of Fracture Interface: An Experimental Study**
---**Fatemeh Pourahmadian**, Roman Tokmashev, Pierre-Augustin Risch, and Bojan B. Guzina, University of Minnesota, Department of Civil, Environmental & Geo-Engineering, Twin Cities, MN 55455

3:10 PM ***Break***

3:30 PM **Characterization of Concrete at Various Freeze Thaw Damage Conditions Using SH-Waves**
---**Katelyn Freeseman**, Kyle Hoegh, and Lev Khazanovich, University of Minnesota, Department of Civil, Environmental and Geo-Engineering, Minneapolis, MN 55455

3:50 PM **Compton Imaging Tomography for One-Sided Access NDE of Nuclear Power Plant Structures, Systems, and Components**
---**Volodymyr Romanov**, Victor Grubsky, and Keith Shoemaker, Physical Optics Corporation, Torrance, CA 90501

4:10 PM **Characterization of Moving Surface Loads with Buried Accelerometers**
---**Eyal Levenberg** and Oded Drori, Faculty of Civil and Environmental Engineering, Technion – Israel Institute of Technology, Technion City, Haifa 32000, Israel

4:30 PM **Inverse Dynamic Visco-Elastic Analysis of Pavement Deflections**
---**Abbas Booshehrian** and Lev Khazanovich, University of Minnesota, Department of Civil, Environmental and Geo- Engineering, Minneapolis, MN 55455

4:50 PM **Nondestructive Testing and Dynamic Monitoring of Wind Turbine Towers**
---**Chih-Hung Chiang**, Keng-Tsang Hsua, and Chia-Chi Cheng, Chaoyang University of Technology, Center for NDT and Department of Construction Engineering, Taichung, 413 TAIWAN ROC; Chih-Peng Yu, National Chung Hsin University, Department of Civil Engineering, Taichung, 402 TAIWAN ROC.

SESSION 25
SENSORS
Matthias Pelkner and Thomas Eason, Chairpersons
Lakeshore C

1:30 PM **Development of Adapted GMR-Probes for Automated Detection of Hidden Defects in Thin Steel Sheets**
---**Matthias Pelkner**[1], Thomas Erthner[1], Rainer Pohl[1], Colin Commandeur[2], and Marc Kreutzbruck[3], [1]BAM, Federal Institute for Materials Research and Testing, 12200 Berlin, Germany; [2]Tata Steel, 1970 CA Ijmuiden, The Netherlands; [3]IKT Institut fuer Kunststofftechnick, Stuttgart, Germany

1:50 PM **Abnormality Detection of Induction Motor Using Standstill Impedance Measurement**
---**Sung Min Shin** and Hyun Gook Kang, Korea Advanced Institute of Science and Technology (KAIST), Department of Nuclear and Quantum Engineering, 291 Daehak-ro, Yuseong-gu, Daejeon 305-701,Republic of Korea

2:10 PM **Non-Intrusive Measurement of Inner Bore Temperature of Small Arms Using Integrated Ultrasonic Transducers**
---**Daniel Lévesque**, Silvio Kruger, Jean-Pierre Monchalin, Martin Lord, and André Beauchesne, National Research Council Canada, Boucherville, QC, Canada; Rogerio Pimentel, Robert Stowe, and Franklin Wong, Defence Research and Development Canada, Valcartier, QC, Canada

2:30 PM **Nonlinear Rayleigh Wave Sound Fields Generated by a Wedge Transducer: Theory and Experiment**
---**Shuzeng Zhang**[1], Hyunjo Jeong[2], Sungjong Cho[2], and Xiongbing Li[1], [1]School of Traffic and Transportation Engineering, Central South University, Changsha, Hunan, 410075, China; [2]Division of Mechanical and Automotive Engineering, Wonkwang University, Iksan, Jeonbuk 5770-749, Republic of Korea

2:50 PM **Development of Flexible SAW Sensors for Non-Destructive Testing of Structure**
---**R. Takpara**[1,2], M. Duquennoy[1], C. Courtois[2], M. Gonon[3], M. Ouaftouh[1], G. Martic[4], M. Rguiti[2], and F. Jenot[1], [1]IEMN-DOAE, Université de Valenciennes, Le Mont Houy, 59313 Valenciennes, France; [2]LMCPA, Université de Valenciennes, PECMA, Z.I. Champ de l'Abbesse, 59600 Maubeuge, France; [3]UMONS, Université de Mons, Place du parc, 4 B7000 Mons – Belgique, [4]CRIBC (membre d'EMRA), 4, Avenue Gouverneur Cornez, 7000 Mons, Belgique

3:10 PM ***Break***

3:30 PM **Robotic and Hand-Held Time Domain Terahertz Thickness Measurement of Multi-Layer Aircraft Coatings**
---**David A. Zimdars** and Jeffrey S. White, Picometrix, LLC., an Advanced Photonix, Inc. Company, Ann Arbor, MI 48104; Juan G. Calzada and Bryan Foos, Air Force Research Laboratory, Wright-Patterson AFB OH 45433

3:50 PM **Microwave Sensor Design for Noncontact Process Monitoring at Elevated Temperature**
---**Yugandhara Rao Yadam**[1] and Kavitha Arunachalam[2], Indian Institute of Technology Madras, Electromagnetic Research Laboratory, Department of Engineering Design, Chennai, Tamilnadu, India 600036

4:10 PM **Quantitative Analysis of Damage Localization for Multi-Layer Composite Structures by Energy Based Acoustic Emission Source Location**
---**Dong-Jin Yoon**[1], Byeong-Hee Han[1], Il-Sik Kim[1], Choon-Su Park[1], and Il-Bum Kwon[1], [1]Center for Safety Measurement, Korea Research Institute of Standards and Science, 267 Gajeong-ro, Yuseong-gu, Daejeon, 305-340, Republic of Korea

4:30 PM **Improved Semi-analytical Simulation of UT Inspections Using a Ray-Based Decomposition of the Incident Fields**
---**Vincent Dorval**, Nicolas Leymarie, and Sylvain Chatillon, CEA LIST, F-91191 Gif-sur-Yvette, France

SESSION 26
6th EAW
Lakeshore A

OPEN SPACE TECHNOLOGY WORKSHOP
Ralf Holstein and Greg Selby

1:30 PM **5…..6 Different Discussion Groups with Moderators**

How to Live Holistic Reliability Concepts?
Flow of Information

Balance Between Regulations and Culture?
How to Overcome the "Delta"?

3:10 PM ***Break***

PRESENTATION OF GROUP SUMMARIES/EVALUATION OF THE WORKSHOP
Christina Mueller

4:10 PM **Summaries/Evaluation of Workshop**

5:40 PM **End of Workshop**

SESSION 27
X-RAY, CT, AND RADIOGRAPHIC METHODS I
Uwe Ewert and Joe Gray, Co-Chairpersons
Lakeshore A

8:30 AM **Radiographic Applications in Micro Electronic Industries**
---P. Krüger[1], **N. Meyendorf**[1], M. Oppermann[2], P. Sättler[1] and K.-J. Wolter[2], [1]Fraunhofer IKTS-MD, Berlin and Dresden, [2]Technische Universitaet Dresden, Electronics Packaging Lab. (IAVT), Germany

8:50 AM **MOVED FROM SESSION 32 - Multi-Scale X-Ray Romography for Advanced Packaging: From Micro to Nano**
---**Ehrenfried Zschech**[1,2], Markus Loeffler[2], Juergen Gluch[1], [1]Fraunhofer IKTS-MD Dresden, Germany; [2]Technische Universität Dresden, Dresden Center for Nanoanalysis (DCN) and Center for Advancing Electronics Dresden (cfaed), Germany

9:10 AM **Implementation and Evaluation of Two Helical CT Reconstruction Algorithms in CIVA**
---**Hussein Banjak**[1,2], Marius Costin[1], Caroline Vienne[1], and Valérie Kaftandjian[2], [1]CEA, LIST, Département Imagerie et Simulation pour le Contrôle, F-91191 Gif-sur-Yvette, France; [2]LVA, Laboratoire Vibrations Acoustique, INSA-Lyon, F-69621 Villeurbanne, France

9:30 AM **Application of Offset-CT Scanning to the Inspection of High Power Feeder Lines and Connections**
---**Daniel Schneberk**, Robert Maziuk, Boris Soyfer, N. Shashishekhar, and Rahul Alreja, V.J. Technologies, 89 Carlough Road, Bohemia, NY 11716

9:50 AM **Corrosion Monitoring with Tangential Radiography and Limited View Computed Tomography**
---**Uwe Ewert**[1], M. Tschaikner[1], Stefan Hohendorf[1], Carsten Bellon[1], Misty I. Haith[2], Peter Huthwaite[2], and Michael J. S. Lowe[2], [1]BAM-Federal Institute for Materials Research and Testing, Berlin, Germany; [2]Imperial College London, London, United Kingdom

10:10 AM ***Break***

10:30 AM **Modelling Based Radiography for NDE of Subsea Pipelines**
---**Misty I. Haith**[1], Uwe Ewert[2], Stefan Hohendorf[2], Carsten Bellon[2], Andreas Deresch[2], Peter Huthwaite[1], Michael J. S. Lowe[1], and Uwe Zscherpel[2], [1]Imperial College, Department of Mechanical Engineering, London, United Kingdom; [2]BAM Federal Institute for Materials Research and Testing, Berlin, Germany

10:50 AM **An Optical Scanner Model for Computed Radiography Systems**
---**Andreas Schumm**[1], Min Yao[2], Angela Peterzol-Parmentier[3], Valerie Kaftandjian[2], and Philippe Duvauchelle[2], [1]EDF R&D – EDF-Lab les Renardieres 77818 Moret sur Loing, France; [2]INSA Lyon – 25 avenue Jean Capelle 69621 Villeurbanne, France; [2]Areva NDE Solutions – 4 rue Thomas Dumorey, 71100 Chalon-sur-Saône, France

11:10 AM **NDE of Spacecraft Materials Using 3D Compton Backscatter X-Ray Imaging**
---**Eric Burke**, NASA Langley Research Center, Hampton, VA 23681; Victor Grubsky, Volodymyr Romanov, and Keith Shoemaker, Physical Optics Corporation, 1845 W. 205th Street, Torrance, CA 90501

11:30 AM **Scintillating Quantum Dots for Imaging X-rays (SQDIX) for Aircraft Inspection**
---**Eric Burke**[1], Phillip Williams, and Stan Dehaven, [1]NASA Langley Research Center, Hampton VA 23681

11:50 AM **Application of Dual-Energy X-Ray Techniques for Automated Food Container Inspection**
---**N. Shashishekhar**[1] and D. Veselitza[1], [1]V.J. Technologies, Inc., 89 Carlough Rd, Bohemia, New York 11716

12:10 PM ***Lunch***

SESSION 28
NDE OF CHARACTERIZATION
Eric Lindgren and John Aldrin, Co-Chairpersons
Nicollet D2

8:30 AM **Model-Based Inverse Methods for Sizing Cracks of Varying Shape and Location in Bolt-Holt Eddy Current (BHEC) Inspections**
---**John C. Aldrin**, Computational Tools, Gurnee, IL, 60031; Harold A. Sabbagh, Liming Zhao, Elias Sabbagh, and R. Kim Murphy, Victor Technologies LLC, Bloomington, IN 47401; Mark Keiser, Jennifer Flores-Lamb, and David S. Forsyth, TRI/Austin, Austin, TX 78746; Eric A. Lindgren and Ryan Mooers, Air Force Research Laboratory, Wright-Patterson AFB, OH 45433

8:50 AM **Flaw Characterization Using Inversion of Eddy Current Response and the Effect of Filters and Scan Resolution**
---**Erin K. Oneida** and Eric B. Shell, Wyle, Dayton, OH 45440; John C. Aldrin, Computational Tools, Gurnee, IL, 60031; Harold A. Sabbagh, Elias Sabbagh, and R. Kim Murphy, Victor Technologies LLC, Bloomington, IN 47401; Siamack Mazdiyasni and Eric A. Lindgren, Air Force Research Laboratory, Wright-Patterson AFB, OH 45433

9:10 AM **Effect of Angular Variations on Split D Differential Eddy Current Probe Response**
---**Ryan Mooers**, Air Force Research Labs, Material State Awareness and Supportability Branch, Wright Patterson Air Force Base, Wright Patterson, OH, 45433; John Aldrin, Computational Tools, Gurnee Il, 60031

9:30 AM **Wavefield Data Analysis to Characterize Angle-Beam Shear Waves Scattered from Crack-Like Defects**
---**Alexander J. Dawson**, Jennifer E. Michaels, Joseph W. Kummer, and Thomas E. Michaels, Georgia Institute of Technology, School of Electrical and Computer Engineering, Atlanta, GA 30332-0250

9:50 AM **Root-Cause Estimation of Ultrasonic Scattering Signatures within a Complex Textured Titanium Alloy**
---**James L. Blackshire**[1], Shaun Freed[2], and Jeong K. Na[2], [1]Air Force Research Lab (AFRL/RXCA), Wright-Patterson AFB, OH 45433; [2]WYLE Laboratories, Beavercreek, OH 45433

10:10 AM ***Break***

10:30 AM **Ultrasound Finite Element Simulation Sensitivity to Anisotropic Titanium Microstructures**
---**Shaun Freed**[2], James L. Blackshire[1], and Jeong K. Na[2]; [1]Air Force Research Lab (AFRL/RXCA), Wright-Patterson AFB, OH 45433; [2]Wyle Laboratories, Dayton, OH 45440

10:50 AM **Progress in Model Development for Eddy Current Response in the Presence of Small Conductivity Changes**
---**Matt Cherry**[1], Shamachary Satish[2], Ryan Mooers[1], and Adam Pilchak[1], [1]Air Force Research Labs, Materials and Manufacturing Directorate, WPAFB, OH 45433; [2]University of Dayton Research Institute, Structural Integrity Division, WPAFB, OH 45433

11:10 AM **Uncertainty Quantification in Modeling and Measuring Components with Resonant Ultrasound Spectroscopy**
---**Eric Biedermann**[2], Leanne Jauriqui[2], John C. Aldrin[3], and Siamack Mazdiyasni[1], [1]Air Force Research Laboratory (AFRL/RXCA), Wright-Patterson AFB, OH 45433; [2]Vibrant Corp., Albuquerque, NM 87113; [3]Computational Tools, Gurnee, IL 60031

12:10 PM ***Lunch***

SESSION 29
NONLINEAR ULTRASONICS
Katie Matlack and Larry Jacobs, Co-Chairpersons
Nicollet D3

8:30 AM **Quantitative Comparison of Laser and Air-Coupled Nonlinear Ultrasonics in Surface Wave Measurements**
---**David Torello**[1], Jin-Yeon Kim[2], Jianmin Qu[3], and Laurance J. Jacobs[1,2], [1]G. W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology, Atlanta, GA 30332; [2]School of Civil and Environmental Engineering, Georgia Institute of Technology, Atlanta, GA 30332; [3]Department of Civil and Environmental Engineering, Northwestern University, Evanston, IL 60208

8:50 AM **Acoustic Nonlinearity Parameters for Transversely Isotropic Polycrystalline Materials**
---**Christopher M. Kube** and Joseph A. Turner, University of Nebraska-Lincoln, Department of Mechanical and Materials Engineering, Lincoln NE 68588

9:10 AM **A Micromechanics Model for the Acoustic Nonlinearity Parameter in Solids with Distributed Microcracks**
---Youxuan Zhao[1,2], Yanjun Qiu[1], **Laurence J. Jacobs**[3], and Jianmin Qu[1]; [1]School of Civil Engineering, Southwest Jiaotong University, Chengdu 610031, China; [2]Department of Civil and Environmental Engienering, Department of Mechanical Engineering, Northwestern University, Evanston, IL 60208; [3]College of Engineering, Georgia Institute of Technology, Atlanta, GA 30332-0360

9:30 AM **Nonlinear Ultrasonic Imaging of Closed Cracks in a Coarse Grained Stainless Steel by Global Preheating and Local Cooling**
---**Yoshikazu Ohara**, Koji Takahashi, Yoshihiro Ino, and Kazushi Yamanaka, Tohoku University, Department of Materials Processing, Sendai, 980-8579, Japan

9:50 AM **Rapid and Exhaustive Damage Imaging in Composite Plates without Contact Using Air-Coupled Nonlinear Elastic Wave Spectroscopy**
---**Marcel C. Remillieux**[1], Lukasz Pieczonka[2], Pierre-Yves Le Bas[1], T. J. Ulrich[1], and Brian E. Anderson[1], [1]Geophysics Group (EES-17), MS: D446, Los Alamos National Laaboratory, Los Alamos, New Mexico 87545; [1]Department of Robotics and Mechatronics, AGH University of Science and Technology, Al. A. Mickiewicza 30, 30-059 Krakow, Poland

10:10 AM ***Break***

10:30 AM **Analytical and Numerical Modeling of Non-Collinear Shear Wave Mixing at an Imperfect Interface**
---**Ziyin Zhang**[1], Peter B. Nagy[1], and Waled Hassan[2], [1]Department of Aerospace Engineering and Engineering Mechanics, University of Cincinnati, Cincinnati, OH 45221; [2]Rolls-Royce Corporation, Indianapolis, IN 46225

10:50 AM **Parametric Analysis of Ultrasonic Wave Mixing**
---**Jack Potter**, Jon Alston, and Anthony Croxford, University of Bristol, Department of Mechanical Engineering, Queen's Building, University Walk, Bristol BS8 1TR, United Kingdom

11:10 AM **Enhanced Nonlinear Inspection of Diffusion Bonded Interfaces Using Reflected Non-Collinear Ultrasonic Wave Mixing**
---Ziyin Zhang,[1] Peter B. Nagy,[1] and **Waled Hassan**[2], [1]Department of Aerospace Engineering and Engineering Mechanics, University of Cincinnati, Cincinnati, OH 45221; [2]Rolls-Royce Corporation, Indianapolis, IN 46225

11:30 AM **On the Feasibility of Nonlinear Assessment of Fatigue Damage in Hardened IN718 Specimens Based on Non-Collinear Shear Wave Mixing**
---Ziyin Zhang[1], **Peter B. Nagy**[1], and Waled Hassan[2], [1]University of Cincinnati, Department of Aerospace Engineering and Engineering Mechanics, Cincinnati, OH 45221; [2]Rolls-Royce Corporation, Indianapolis, IN 46225

11:50 PM **OPEN**

12:10 PM ***Lunch***

SESSION 30

NUCLEAR

Bill Glass and Andrew Gavens, Chairpersons
Nicollet D1

8:30 AM **Mitigating the Effects of Surface Morphology Changes During Ultrasonic Wall Thickness Monitoring**
---**Frederic B Cegla** and Attila Gajdacsi, Imperial College London, NDE Group, Department of Mechanical Engineering, Exhibition Road, London, SW7 2AZ, United Kingdom

8:50 AM **NDE of Power Station Creep Weld Failures Using a PD Technique**
---**Joseph Corcoran**, Imperial College, 318 City & Guilds Building, Exhibition Road, London SW7 2AZ, United Kingdom

9:10 AM **Conformable Eddy Current Array Delivery**
---**Rahul Summan**[1], Gareth Pierce[1], Charles Macleod[1], Gordon Dobie[1], Gary Bolton[2], Angélique Raude[3], Colombe Dalpé[3], and Johannes Braumann[4], [1]Department of Electronic and Electrical Engineering, University of Strathclyde, Glasgow, G1 1XW, United Kingdom; [2]National Nuclear Laboratory, Chadwick House, Warrington Road, Birchwood Park, Warrington, WA3 6AE, United Kingdom; [3]Eddyfi Europe SAS, 110 Allée des Lilas, Les Fenières, Parc Industriel de la Plaine de l'Ain, 01150, Saint-Vulbas, France; [4]Association for Robots in Architecture, Vienna University of Technology, Karlsplatz 13, 1040 Wien, Austria

9:30 AM **Experimental Validation of Ultrasonic NDE Simulation Software**
---G. Dib, **M. R. Larche**, A. A. Diaz, S. L. Crawford, M. S. Prowant, and M. T. Anderson, Pacific Northwest National Laboratory, Richland, WA 99354

9:50 AM **Development of Under-Sodium Viewing Technology for In-Service Inspection of Liquid Metal Fast Reactors**
---**M. R. Larche**, D. L. Baldwin, M. K. Edwards, R. A. Mathews, T. S. Hartman, M. S. Prowant, and A. A. Diaz, Pacific Northwest Laboratory, P. O. Box 999, Richland, WA 99352

10:10 AM ***Break***

10:30 AM **Modeling Ultrasonic Transducers for Operation in Liquid Metal and Molten Salt Small Modular Reactors (SMR)**
---**Prathamesh N. Bilgunde** and Leonard J. Bond, Iowa State University, Center for Nondestructive Evaluation, Applied Sciences Complex II, 1915 Scholl Road, Ames, IA 50011

10:50 AM **WITHDRAWN - PARENT Round Robin Blind Test**
---**Ryan Meyer**, Pacific Northwest National Laboratory, 902 Battelle Blvd., P. O. Box 999, MSIN K5-25, Richland, WA 99352

11:10 AM **Assessment of Key Indicators of Aging Cables in Nuclear Power Plants – Interim Status**
---**S. W. Glass**, P. Ramuhalli, L. S. Fifield, M. S. Prowant, G. Dib, J. R. Tedeschi, J. D. Suter, A. M. Jones, M. S. Good, and A. F. Pardini, Pacific Northwest National Laboratory, Richland WA 99352

11:30 AM **Limitations of Eddy Current Testing in a Fast Reactor Environment**
---**John Bowler**, Iowa State University, Center for Nondestructive Evaluation, Applied Sciences Complex II, 1915 Scholl Road, Ames, IA 50011

11:50 PM **OPEN**

12:10 PM ***Lunch***

SESSION 31
PROFESSIONAL POSTERS
1:30 PM – 3:10 PM
Nicollet AB

NOTE: All Posters will be displayed continuously Monday through Thursday in Nicollet AB. During the Tuesday and Thursday afternoon poster sessions, the individual presenters will be on hand to answer questions.

Ultrasonics

Flaw Sizing Method Based on Ultrasonic Dynamic Thresholds and GRNN
---**Yongfeng Song**[1], Yiling Wang[1], Peijun Ni[3], and Xiongbing Li[1,2], [1]CAD/CAM Institute, Central South University, Changsha 410075, China; [2]State Key Laboratory of Powder Metallurgy, Central South University, Changsha 410083, China; [3]The Ningbo Branch of Ordnance Science Institute of China, Ningbo 315103, China

Evaluation of Grain Size from Backscattering Signals Using the Finite Element Method
---Youxuan Zhao[1,2], Sivaramanivas Ramaswamy[3], **Shyamsunder Mandayam**[3], and Jianmin Qu[2]; [1]Southwest Jiaotong University, School of Civil Engineering, Chengdu 610031, China; [2]Northwestern University, Department of Civil and Environmental Engineering, Department of Mechanical Engineering, Evanston, IL 60208; [3]GE Global Research Centre, John F. Welch Technology Centre, Bangalore, 560066, India

Signal Phase Correction of Ultrasonic Synthetic Aperture Imaging for Inhomogeneous Materials with Uneven Surface
---**Lin Luo**, Caiqun Ye, and Xiaorong Gao, Southwest Jiaotong University, School of Physics Science and Technology, Chengdu, China 610031

Atomic Library Optimization for Sparse Pulse Ultrasonic Signal Decomposition and Reconstruction
---**Shoupeng Song**[1,2], Yingxue Li[1], and Aleksandar Dogandzic[2], [1]Jiangsu University, Department of Instrument Science and Engineering, Zhenjiang, China; [2]Iowa State University, Center for Nondestructive Evaluation, Ames, IA 50011

Advanced Defect Detection Algorithm Using Clustering in Ultrasonic NDE
---**Rui Gongzhang (presented by Jeffrey Dobson)** and Anthony Gachagan, University of Strathclyde, Centre for Ultrasonic Engineering, Glasgow, G1 1XW

Ultrasound Scatter in Heterogeneous 3D Microstructures
---**R. Roberts** and R. Grandin, Iowa State University, Center for Nondestructive Evaluation, Applied Sciences Complex II, 1915 Scholl Road, Ames IA 50014

Techniques and Software Tools for Estimating Ultrasonic Signal-to-Noise Ratios
---**C.-P. Thomas Chiou**, Frank J. Margetan, Matthew McKillip, Brady J. Engle and Ron Roberts, Iowa State University, Center for Nondestructive Evaluation, Applied Sciences Complex II, 1915 Scholl Road, Ames, IA 50011-3042

Spatial Image Compounding Applied to a Phase Coherence Corrected UT-PA Technique for Inspecting Nuclear Components of Coarse-Grained Structure
---**Pablo Katchadjian** and Alejandro Garcia, Av. Gral Paz 1499, San Martin – Pcia, de Buenos Aires, Argentina

Non-Destructive Evaluation of Spiral-Welded Pipes Using Flexural Guided Waves
---Zhang Xiaowei[1], Tang Zhifeng**[2], and Lv Fuzai[1];** [1]Institute of Modern Manufacture Engineering, Zhejiang University, China 310027; [2]Institute of Advanced Digital Technologies and Instrumentation, Zhejiang University, China 310027)

Ultrasonic Instrumentation and Systems

Development of Ultrasonic Pulser for Large Displacement Wave Generation Using Soft PZT Element Transducer
---**Ren Koda**, Tsuyoshi Mihara, and Yoshio Udagawa, Tohoku University, Graduate School of Engineering, Sendai, Japan

Data Driven Force Control for Soft Dry Contact Hertzian Ultrasonic Probe
---**Emanuel Gallegos**, Arturo Baltazar, and Chidentree Treesatayapun, CINVESTAV, Robotics and Advanced Manufacturing Program – Saltillo Campus. Ramos Arizpe, Coahuila, 25903, México

Full-Matrix Capture and USB 3.0 for Open Platform Phased Array Instrument
---**Gavin Dao**[1], Remi Lallement[1], Ewen Carcreff[2] and Dominique Braconnier[2], [1]Advanced OEM Solutions, 8044 Montgomery Road #700, Cincinnati, OH, 45236; [2]The Phased Array Company, 9078 Union Centre Blvd., Suite 350, West Chester, OH, 45069

Development of an Ultrasonic Tomography System Based on Discrete Wavelets
---**Rodrigo Torres-Castillo** and Arturo Baltazar, Center for Research and Advanced Studies, Robotics and Advanced Manufacture Program, Saltillo Campus. Ramos Arizpe, Coahuila, 25903, Mexico

Detectability of Distributed Defects According to Synthetic Aperture Imaging Algorithm
---**Jongbeom Kim**[1], Hogeon Seo[1], Jihyun Jun[1], Kyung-Young Jhang[2], [1]Hanyang University, Department of Mechanical Convergence Engineering, Seoul 133-791, Republic of Korea; [2]Hanyang University, School of Mechanical Engineering, Seoul 133-791, Republic of Korea

Ultrasonic Concrete

Insights into Alkali Silica Reaction Damage in Concrete Through Acoustic Nonlinearity
---**Mohammad Mehdi Rashidi**, J.-Y. Kim, L. J. Jacobs, and K. E. Kurtis, Georgia Institute of Technology, 581 Morgan St. NE, Atlanta, GA 30308

Characterization of Stress-Induced Micro-Cracking in Concrete Using Nonlinear Acoustic Techniques
---**Parisa Shokouhi**[1], Colton R. Lake[2], Pierre-Yves Le Bas[2], Jacques Riviere[1], Robert Guyer[2], and T. J. Ulrich[2] [1]The Pennsylvania State University, University Park, PA 16802 [2]Los Alamos National Laboratory, Los Alamos, NM 87545

Multi-Mode Approaches

Multimode Model Based Defect Characterization in Composites
---**R. Roberts** and S. Holland, Iowa State University, Center for Nondestructive Evaluation, Applied Sciences Complex II, 1915 Scholl Road, Ames IA 50014

NDE Characterization in Developing Process Monitoring and Additive Manufacturing Quality Control
---**L. Koester**, J. Gray, and L. Bond, Iowa State University, Center for NDE, Applied Sciences Complex II, 1915 Scholl Road, Ames, IA 50014

Non-Destructive Tools as an Aid in Fatigue Testing
---M. Mordasky, W. Zhao, and **G. C. Ojard**, United Technologies Research Center, East Hartford, CT 06108

Fusion of Multi-sensory Non-destructive Testing Data for Reliable Detection of Surface Cracks: Signal Level vs. Decision Level
---Rene Heideklang[1] and **Parisa Shokouhi**[2], [1]BAM Federal Inst. For Matls. Res. & Test, Unter den Eichen 87, Berlin 12205, Germany; [2]The Pennsylvania State University, University Park, PA 16802

AE Mechanisms of Stress Corrosion Cracking Under Micro Cell in SUS304 Stainless Steel
---**Mitsuharu Shiwa**, Hiroyuki Masuda, and Hisashi Yamawaki, National Institute for Materials Science, Materials Reliability Unit, Tsukuba; Kaita Ito and Manabu Enoki, The University of Tokyo, Department of Materials Engineering, Tokyo 113-8656, Japan

Ultrasonic and Magnetic Barkhausen Emission Measurements for Characterization of Pipeline Steels
---**Brady J. Engle**[1,2], Lucinda J. Smart[1,3,4], and Leonard J. Bond[1,2,3], [1]Center for Nondestructive Evaluation, 1915 Scholl Road, 111 ASC II, Iowa State University, Ames, IA 50011; [2]Department of Aerospace Engineering, 1200 Howe Hall, Iowa State University, Ames, IA 50011; [3]Department of Mechanical Engineering, 2025 Black Engineering, Ames, IA 50011; [4]Kiefner and Associates, 1608 S. Duff Avenue, Suite 400, Ames, IA 50010

Electromagnetic and Eddy Currents

Numerical Study on Distribution Law of Magnetic Field and Temperature Field Around the Crack Induced by Eddy Currents
---**Min He**, Wenpei Zheng, Laibin Zhang, and Fan Zhou, China University of Petroleum, College of Mechanical and Transportation Engineering, Beijing 102249, China

Numerical Calculation of the Yoke-Induced Electromagnetic Field in Ferromagnetic Planar Specimens for Use in Material Evaluation Applications: A Performance Study
---Thomas Svatoň and **Anastasios Skarlatos (presented by Roberto Miorelli)**, CEA LIST, Centre de Saclay, 91191, Gif-sur-Yvette cedex, France

Eddy-Current NDE Inverse Problem with Sparse Grid Algorithm
---**Liming Zhou**, Harold A. Sabbagh, Elias H. Sabbagh, and R. Kim Murphy, Victor Technologies, LLC, Bloomington, IN 47407-7706; William Bernacchi, Minds-Edge LLC, Indianapolis, IN 46268; John C. Aldrin, Computational Tools, Gurnee, IL 60031; David Forsyth, Texas Research Institute Austin, Austin, TX 78733-6201; Eric Lindgren, Air Force Research Laboratory (AFRL/RXCA), Wright Patterson AFB, OH 45433-7817

Synthetic Transmit Aperture Imaging in Coarse Grained Steels
---Eduardo Lopez Villaverde[1], **Sébastien Robert**[1], and Claire Prada[2], [1]CEA LIST, 91191 Gif-sur-Yvette, France; [2]Institut Langevin, 1 rue Jussieu, 75238 Paris Cedex, France

Preliminary Research on Eddy Current Bobbin Quantitative Test for Heat Exchange Tube in Nuclear Power Plant
---**Pan Qi**, Shusheng Liao, and Hailin Wu, Center of In-service Inspection, China Nuclear Power Operation Technology Corporation, LTD, Wuhan, China 430223

Non Destructive Testing of High-Temperature Pipes Based on Low Frequency Eddy Current Imaging Using a Bobbin-Type Probe
---Jonghyun Seo, Soonbo Shim, Jungmin Kim, **Jinyi Lee**, and Hwa-shik Do, Chosun University, Department of Control and Instrumentation Engineering, Korea, KEPCO Plant Service & Engineering Co., Ltd., Korea

Database Generation and Exploitation for Efficient and Intensive Simulation Studies
---**R. Miorelli**, X. Artusi, and C. Reboud, CEA LIST, Departement Imagerie et Simulation pour le Controle, Gif-sur-Yvette, 91191, France

Further Capacitive Imaging Experiments Using Modified Probes
---**Xiaokang Yin**, An Yan, Zhen Li, Wei Li, and Guoming Chen, China University of Petroleum (East China), Centre for Offshore Equipment and Safety Technology, Qingdao 266580, China; David A. Hutchins, Warwick University, School of Engineering, Coventry CV4 7AL, United Kingdom

Application of Metal Magnetic Memory Technology on Jack-Up Platform
---**Changhang Xu**, Liping Cheng, Gang Wang, Guoming Chen, and Jing Xie, China University of Petroleum, Center for Offshore Engineering and Safety Technology, Qingdao, 266580, China

Surface Crack Detection for Polycrystalline Diamond Compact Bit Using Pulsed Eddy Current Thermography
---Naiwang Zhou, **Changhang Xu**, Jing Xie, and Xumei Gong, College of Mechanical and Electrical Engineering, China University of Petroleum, Qingdao, China

Microwave and MM Wave

Microwave and Millimeter Wave High-Resolution Imaging of Fiberglass Composites
---Mohammad T. Ghasr, Matthew J. Horst, and **R. Zoughi**, Electrical and Computer Engineering Department, Applied Microwave Nondestructive Testing Laboratory (amntl), Missouri University of Science and Technology (S&T), Rolla, MO 65409; Mario Lechuga, R. Rapoza, and C. Renoud, Fiberglass Structural Engineering (FSE), Inc., Bellingham, WA 98226

Vision/Optical/Thermal

Effect of Vibrational Behavior on Frictional Heating Mechanism in Vibrothermography
---**Wonjae Choi**[1*], Manyong Choi[1], Jeounghak Park[1], and Kooahn Kwon[2], [1]KRISS, Center for Safety Measurement, 267 Gajeong-Ro, Yuseong-Gu, Daejeon 305-340, Republic of Korea; [2]University of Science & Technology, Department of Aerospace System, 217 Gajeong-Ro, Yuseong-Gu, Daejeon 305-350, Republic of Korea

Structural Health Monitoring

WITHDRAWN - A 2-D Areal Scan for Imaging Composite Damage Using an Enhanced CCRTM Technique
---**Jiaze He**[1,2] and Fuh-Gwo Yuan[1,2], [1]National Institute of Aerospace, Center for Interated Structural Health Management, Hampton, VA 23666; [2]North Carolina State University, Department of Mechanical and Aerospace Engineering, Raleigh, NC 27695

X-Ray

MOVED TO SESSION 32 - Applications of an X-Ray NDE Simulation (XRSIM) for Developing and Optimizing Inspection Protocal for Aerospace Components—A Case Study
---**S. Singh**[1] and J. Gray[2], [1]Honeywell International, Inc., 110 S. 34th Street, M/S 503-118, Phoenix, AZ 85034; [2]Iowa State University, Center for Nondestructive Evaluation, Applied Sciences Complex II, 1915 Scholl Road, Ames, IA 50011

SESSION 32

X-RAY, CT, AND RADIOGRAPHIC METHODS II

Uwe Ewert and Joseph N. Gray, Co-Chairpersons

Lakeshore A

3:30 PM **Characterization of Pores in High Pressure Die Cast Aluminum Using Active Thermography and Computed Tomography**

---Christiane Maierhofer, Philipp Myrach, Mathias Röllig, **Florian Jonietz**, Bernhard Illerhaus, and Dietmar Meinel, BAM Bundesanstalt für Materialforschung und –prüfung, Berlin, Germany; Uwe Richter, Technical University of Freiberg, Freiberg, Germany; Ronald Miksche, University of Applied Sciences, Dresden, Germany

3:50 PM **Blind Beam-Hardening Correction from Poisson Measurements**

---**Renliang Gu** and Aleksandar Dogandzic, Iowa State University, Center for Nondestructive Evaluation, Applied Sciences Complex II, 1915 Scholl Road, Ames, IA 50011

4:10 PM **MOVED FROM SESSION 31 - Applications of an X-Ray NDE Simulation (XRSIM) for Developing and Optimizing Inspection Protocal for Aerospace Components—A Case Study**

---**S. Singh**[1] and J. Gray[2], [1]Honeywell International, Inc., 110 S. 34th Street, M/S 503-118, Phoenix, AZ 85034; [2]Iowa State University, Center for Nondestructive Evaluation, Applied Sciences Complex II, 1915 Scholl Road, Ames, IA 50011

4:30 PM **MOVED TO SESSION 27 - Multi-Scale X-Ray Romography for Advanced Packaging: From Micro to Nano**

---**Ehrenfried Zschech**[1,2], Markus Loeffler[2], Juergen Gluch[1], [1]Fraunhofer IKTS-MD Dresden, Germany; [2]Technische Universität Dresden, Dresden Center for Nanoanalysis (DCN) and Center for Advancing Electronics Dresden (cfaed), Germany

4:50 PM **Quantum Dots Microstructured Optical Fiber for X-Ray Detection**

---**S. L. DeHaven**, P. A. Williams, and E. R. Burke, NASA Langley Research Center, Mail Stop 231, Hampton, VA 23681

SESSION 33
PIPELINES AND AUTOMATION
Don Palmer, Chairperson
Nicollet D1

3:30 PM **WITHDRAWN - The Impact of Automation and Robotics on Industrial NDE**
---**Donald D. Palmer, Jr.**, Boeing Research & Technology, 5775 Campus Parkway, Bldg. 270A, Room 308, MC S270-3800, Hazelwood, MO 63042

3:50 PM **Automated XML-Based Experiment Logging Increases Throughput and Reduces Errors in Hybrid Manual/Automatic Procedures**
---**Stephen D. Holland** and Tyler Lesthaeghe, Iowa State University, Center for Nondestructive Evaluation, Applied Sciences Complex II, Ames, IA 50014

4:10 PM **Object Motion Tracking in the NDE Laboratory by Random Sample Iterative Closest Point**
---**Rafael Radkowski**, David Wehr, Elizabeth Gregory, and Stephen D. Holland, Iowa State University, Virtual Reality Applications Center and Center for Nondestructive Evaluation, Ames, IA 50011

4:30 PM **Evaluating an SH Wave EMAT System for Pipeline Screening and Extending into Quantitative Defect Measurements**
---**M. Clough** and S. Dixon, University of Warwick, Physics Department, Gibbet Hill Road, Coventry CV4 7AL, United Kingdom; M. Fleming and M. Stone, Sonomatic Ltd., Dornoch House, The Links, Birchwood, Warrington, Cheshire, WA3 7PB, United Kingdom

4:50 PM **Current Deflection NDE for Pipeline Inspection and Monitoring**
---**Rollo Jarvis** and Peter Cawley, Imperial College London, Department of NDE, London, United Kingdom; Peter B. Nagy, University of Cincinnati, Department of Aerospace Engineering and Engineering Mechanics, Cincinnati, Ohio 45221

5:10 PM **Material Property Relationships for Pipeline Steels and the Potential for Application of NDE**
---**Lucinda J. Smart** and Leonard J. Bond, Iowa State University, Center for Nondestructive Evaluation, Applied Sciences Complex II, 1915 Scholl Road, Ames, IA 50011

SESSION 34

UT MICROSTRUCTURAL SCATTERING

Joe Turner and Paul Panetta, Co-Chairpersons
Nicollet D2

3:30 PM **Acoustoelastic Theory of Grain Scattering and Attenuation**
---**Christopher M. Kube** and Joseph A. Turner, University of Nebraska-Lincoln, Department of Mechanical and Materials Engineering, Lincoln NE 68588

3:50 PM **Ultrasonic Scattering Model Based on the Self-Consistent Effective Medium of Polycrystals**
---**Christopher M. Kube** and Joseph A. Turner, University of Nebraska-Lincoln, Department of Mechanical and Materials Engineering, Lincoln NE 68588

4:10 PM **Finite Element Modelling of Wave Propagation in Highly Scattering Materials**
---**A. Van Pamel**, P. Huthwaite, C. Brett, and M. Lowe, Imperial College London, Mechanical Engineering Department, South Kensington Campus, London, SW7 2AZ, United Kingdom

4:30 PM **Grain Scattering Measurements Using Cylindrically Focused Immersion Transducers at Normal Incidence**
---**Andrea Arguelles**, Christopher M. Kube, and Joseph A. Turner, University of Nebraska-Lincoln, Mechanical and Materials Engineering, W342 Nebraska Hall, Lincoln, NE, 68588

4:50 PM **Mode-Converted Diffuse Ultrasonic Backscatter of Elongated Grains**
---**Ping Hu**, Andrea Arguelles, Christopher M. Kube, and Joseph A. Turner, University of Nebraska-Lincoln, Mechanical and Materials Engineering, W342 Nebraska Hall, Lincoln, NE 68588

5:10 PM **Contribution of Double Scattering for Diffuse Ultrasonic Backscatter Measurements on Nickel Alloys**
---Nathanial Matz[1], Ping Hu[1], Sandra Dugan[2], and **Joseph A. Turner**[1], [1]Mechanical and Materials Engineering, University of Nebraska-Lincoln, W342 Nebraska Hall, Lincoln, NE, 68588, [2]Abteilung ZfP im Anlagen- und Maschinenbau, Materialprüfungsanstalt Universität Stuttgart (MPA), Pfaffenwaldring 32, 70569 Stuttgart, Germany

5:30 PM **Ultrasonic Scattering Measurements of Grain Size and Shape in Nickel and Titanium Alloys with Elongated Grains**
--**Paul D. Panetta**[1], Dale McElhone[1], Hualong Du[2], and Waled Hassan[3, 1]Applied Research Associates, Inc., 1206 Great Road Gloucester Point, VA 23062, [2]now at North Carolina State University, Department of Mechanical and Aerospace Engineering, 911 Oval Drive, Raleigh, NC 27695,[3] Rolls-Royce Corporation, 546 South Meridian Street, Indianapolis, IN 46225

SESSION 35
BENCHMARKS
Paul Schafbuch, Chairperson
Nicollet D3

3:30 PM **Results of the 2015 UT Modeling Benchmark Obtained with Models Implemented in CIVA**
---Gwénaël Toullelan[1], Raphaële Raillon[1], Sylvain Chatillon[1], Vincent Dorval[1], and Sébastien Lonne[2], [1]CEA, LIST, 91191 Gif-sur-Yvette, France; [2]EXTENDE, Le Bergson, 15 Avenue Emile Baudot, 91300 Massy, France

3:50 PM **Solution of the WFNDEC 2015 Eddy Current Benchmark with Modal and Numerical Methods**
---**Roberto Miorelli**, Anastasios Skarlatos, and Christophe Reboud, CEA, LIST, Département Imagerie et Simulation pour le Contrôle, Gif-sur-Yvette 91191, France; Theodoros Theodoulidis, University of Western Macedonia, Department of Mechanical Engineering, Kozani 50100, Greece; Nikolaos Poulakis, Technological Education Institute of Western Macedonia, Department of Electrical Engineering, Koila 50100, Greece

4:10 PM **2015 WFNDEC Eddy Current Benchmark Modeling of Impedance Variation in Coil Due to a Crack Located at the Plate Edge**
---**João V. G. Rocha**, Cesar G. Camerini, and Gabriela R. Pereira, Laboratory of Non-Destructive Testing, Corrosion and Welding, Federal University of Rio de Janeiro – RJ, Brazil

SESSION 36
NON-CONTACT AND LASER ULTRASONICS
Daniel Levesque, Co-Chairpersons
Nicollet D1

8:30 AM **Focusing of Ferroelectret Air-Coupled Ultrasound Transducers**
---**Mate Gaal**, Jürgen Bartusch, Elmar Dohse, and Enrico Köppe, Federal Institute for Materials Research and Testing (BAM), Berlin, Germany

8:50 AM **Rapid Non-Contact Inspection of Composite Ailerons Using Air-Coupled Ultrasound**
---**Rabi Sankar Panda**[1], Krishnan Balasubramaniam[1], Prabhu Rajagopal[1], Oleksii Karpenko[2], Lalita Udpa[2] and Mahmoodul Haq[3], [1]Centre for Nondestructive Evaluation, Department of Mechanical Engineering, Indian Institute of Technology Madras, Chennai-600036, Tamil Nadu, India; [2]Department of Electrical and Computer Engineering, Michigan State University, East Lansing, MI 48824; [3]Department of Civil and Environmental Engineering, Michigan State University, East Lansing, MI 48824

9:10 AM **Non-Contact Ultrasonic Defect Imaging in Composites**
---**Frédéric Cohen Tenoudji**[1,2], Jean Marie Citerne[1,2], Hugo Dutilleul[1,2], and Dominique Busquet[1,2], [1]Sorbonne Universités, UPMC Univ Paris 06, UMR 7190, Institut Jean le Rond d'Alembert, F-75005, Paris, France; [2]CNRS, UMR 7190, Institut Jean le Rond d'Alembert, F-75005, Paris, France

9:30 AM **Influence of the Superficial Layer on the Directivity Patterns of Ultrasonic Waves Generated by Laser in a Bi-Layer Sample**
---**E. Anagnostopoulos**[1], D. Ségur[1], T. Dehoux[2], and B. Audoin[3], [1]CEA, LIST, Département Imagerie Simulation pour le Contrôle, France; [2]CNRS, 12M, UMR 5295, F-33400 Talence, France; [3]Univ. Bordeaux, 12M, UMR 5295, F-33400 Talence, France

9:50 AM **Spatially Resolved Acoustic Spectroscopy (SRAS) Recent Developments and Progress Towards an Industrial Prototype**
---**Jethro Coulson**[1,2], Wenqi Li[1], Richard Smith[1], and Steve D. Sharples[1], [1]Applied Optics Group, University of Nottingham; [2]Renishaw plc.

10:10 AM ***Break***

10:30 AM **Elastic Limit in Laser Shockwave Experiments to Relate Velocity Measurements**
---**James A Smith** and Jeffrey M. Lacy, Idaho National Laboratory, Idaho Falls, ID 83415; Daniel Lévesque, Jean-Pierre Monchalin, and Martin Lord, National Research Council Canada, Boucherville, QC, Canada

10:50 AM ***Adjourn***

SESSION 37
CHARACTERIZATION
R. A. Adebisi and Marc Keutzbruck, Chairpersons
Nicollet D2

8:30 AM **Characterization of Cohesive and Adhesive Properties of Adhesive Bonds Using Transmitted Ultrasonic Waves**
---Emmanuel Siryabe[1], **Mathieu Renier**[1], Anissa Meziane[1], Jocelyne Galy[2], and Michel Castaings[1]; [1]Univ. Bordeaux, I2M, UMR 5295 CNRS, Bordeaux INP, Arts et Métiers Paris Tech, F-33400, Talence, France; [2]Laboratoire Ingénierie des Matériaux Polymères, IMP – UMR 5223 CNRS- INSA Lyon, Villeurbanne Cedex, France

8:50 AM **Crack Growth Monitoring at CFRP Bond Lines**
---**Markus Rahammer**, Wolfgang Adebahr, Stefan Gröninger, and Marc Kreutzbruck, University of Stuttgart, Institut für Kunststofftechnik, 70569 Stuttgart, Germany; Ronny Sachse, University of Stuttgart, Institute of Aircraft Design, 70569 Stuttgart, Germany

9:10 AM **Modern Non-Destructive Testing and Characterization Methods for the Inspection of Composite Materials and Components**
---**Marc Kreutzbruck**, University of Stuttgart, Institut für Kunststofftechnik, 70569 Stuttgart, Germany

9:30 AM **Evaluation of Grain Size in Curved Component Using an Ultrasonic Attenuation Method with Diffraction Correction**
---Chenxin Zhang[1], Xiongbing Li[1,2], and Xiaoqin Han[1], [1]CAD/CAM Institute, Central South University, Changsha, Hunan 410075, China; [2]State Key Laboratory of Powder Metallurgy, Central South University, Changsha, Hunan 410083, China

9:50 AM **Stress Measurement by Evaluation of Thermal Conductivity**
---Libing Bai, Yuhua Cheng, Xiaodong Zhou, Chun Yin, Kai Chen, and Jie Zhang, University of Electronic Science and Technology of China, School of Automation Engineering, Chengdu, 611731, China

10:10 AM **Break**

10:30 AM **Magnetic Hysteresis Model Considering Microstructural Feature Distribution**
---Jun Liu and Claire Davis, University of Warwick, Warwick Manufacturing Group, Coventry CV4 7AL, United Kingdom

10:50 AM **Experimental Study of Ultrasonic Lamb Wave Mixing During Tempering of Modified 9Cr-1Mo Steel**
---Avijit Kr Metya[1,2], M. Ghosh[1], N. Parida[1], and Krishnan Balasubramaniam[2], [1]MST Division, CSIR-National Metallurgical Laboratory, Jamshedpur-831007, India; [2]Center for NDE, Mechanical Engineering Department, IIT-Madras, Chennai-600036, India

11:10 AM **Elastic Constants Measurements of a Ti–7al Using Resonant Ultrasound Spectroscopy**
---R. A. Adebisi[2], S. Sathish[2], and P. A. Shade[1], [1]Air Force Research Laboratory, Wright Patterson AFB OH 45433; [2]University of Dayton Research Institute, Dayton OH, 45469

11:30 AM ***Adjourn***

SESSION 38

EDDY CURRENT II

John Bowler and Harold Sabbagh, Chairpersons
Nicollet D3

8:30 AM **NDE Damage Characterization of Complex Aircraft Structures by Inverse Methods: Advances in Multiscale Models**
---R. Kim Murphy, **Harold A. Sabbagh**, Elias H. Sabbagh, and Liming Zhou, Victor Technologies, LLC, Bloomington, IN 47407-7706; William Bernacchi, Minds-Edge LLC, Indianapolis, IN 46268; John C. Aldrin, Computational Tools, Gurnee, IL 60031; David Forsyth, Texas Research Institute Austin, Austin, TX 78733-6201; Eric Lindgren, Air Force Research Laboratory (AFRL/RXCA), Wright Patterson AFB, OH 45433-7817

8:50 AM **Identification of Rebars in a Reinforced Mesh Using Eddy Current Method**
---Paweł Karol Frankowski, Ryszard Sikora, and **Tomasz Chady**, West Pomeranian University of Technology, Szczecin, Poland

9:10 AM **Eddy Current Tube Inspection Simulation Using a Rotary Probe**
---**J. R. Bowler** and T. Wu, Iowa State University, Center for Nondestructive Evaluation, Applied Sciences Complex II, 1915 Scholl Road, Ames, IA 50011

9:30 AM **Inversion Methods for Alternating Current Potential Drop Measurements**
---**J. R. Bowler**, Y. Ji, and R. Quddes, Iowa State University, Center for Nondestructive Evaluation, Applied Sciences Complex II, 1915 Scholl Road, Ames, IA 50011

9:50 AM **Application of Induced Circumferential Current for Cracks Inspection on Pipe String**
---Xin'an Yuan, Wei Li, **Xiaokang Yin**, Guoming Chen, and Jiuhao Ge, China University of Petroleum, Center for Offshore Equipment and Safety Technology, Qingdao 266580, China

10:10 AM ***Break***

10:30 AM **Analytical Solution for the Effect of the Permitivity of Coating Layer on the Eddy Current Generated in an Aluminum Sample by EMAT**
---**Sun Feiran**, Sun Zhenguo, and Chen Qiang, Tsinghua University, Department of Mechanical Engineering, Beijing 100084, China

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10:50 AM **Effects of Magnetic Interferences in Magnetostrictive Patch Transducers on Ultrasonic Signals**
---**Jun Kyu Lee**, Joo Kyung Lee, and Yoon Young Kim, Seoul National University, School of Mechanical and Aerospace Engineering and Institute of Advanced Machinery and Design, 1 Gwanak-ro, Gwanak-gu, Seoul, 151-742, Republic of Korea

11:10 AM **The Optimal Impedance of an EMAT**
---Julio A Isla, Matthias Seher, Richard E. Challis, and Frederic Cegla, Imperial College London, NDE Group, Department of Mechanical Engineering, Exhibition Road, London, SW7 2AZ, United Kingdom

11:30 AM ***Adjourn***

SESSION 39
STRUCTURAL HEALTH MONITORING
Bernd Köhler, Chairperson
Lakeshore A

8:30 AM **Scattering of High Order Guided Wave Modes Around a Through Thickness Circular Hole**
---**Christophe Travaglini**[1], Christophe Bescond[2], Demartonne Ramos Franca[1], Silvio E. Kruger[2], Martin Viens[1], and Pierre Belanger[1]; [1]Département de Génie Mécanique, École de Technologie Supérieure, 1100 rue Notre-Dame Ouest, Montréal (Québec), H3C 1K3, Canada; [2]Conseil National de Recherches Canda, 75 boulevard de Mortagne, Boucherville (Québec), J4B 6Y4, Canada

8:50 AM **Testing and Control of Residual Stress for Aluminum Alloy**
---**Chunguang Xu**, Wentao Song, Qinxue Pan, Huanxin Li, and Shuai Liu, Beijing Institute of Technology, 5th South Zhongguancun Street, Haidian District, Beijing, China, 100081 Beijing, China

9:10 AM **OPEN**

9:30 AM **Application of Ultrasonic Thickness Measurement Technique for Evaluation of Copper Stave in the Blast Furnace**
---**Sang-Woo Choi**, Nam-Ho Shin, and Tae-Hwa Choi, 6261, Donghaean-ro, Nam-gu, Pohang-si, Gyengbuk 790-300, POSCO, Pohang, South Korea

9:50 AM **Rapid Non-Contact Guided Ultrasonic Method for Inspection of Hidden and Curved Regions in Composite Aerospace Structures**
---Dileep Koodalil and **Krishnan Balasubramaniam (presented by Rabi Panda)**, Indian Institute of Technology Madras, Centre for Non-destructive Evaluation and Department of Mechanical Engineering, Chennai-600036, Tamil Nadu, India

10:10 AM ***Break***

10:30 AM **Locating Damages in a Complex Structure Using a Single Fixed Ultrasonic Transducer**
---**S. Rodriguez**[1,2], M. Veidt[3], M. Castaings[1], Eric Ducasse[1], and M. Deschamps[1], [1]Univ. Bordeaux, 12M, UMR 5295, F-33400, Talence, France; CNRS, 12M, UMR 5295, F-33400, Talence, France; Bordeaux INP, 12M, UMR 5295, F-33400, Talence, France; Arts et métiers Paris Tech, 12M, UMR 5295, F-33400, Talence, France; [2]Cooperative Research Centre for Advanced Composite Structures, I/320 Lorimer Street, Port Melbourne, Victoria, 3207, Australia; [3]School of Mechanical and Mining Engineering, The University of Queensland, Brusbane St. Lucia, Queensland 4072, Australia

10:50 AM **Shear Horizontal Piezoelectric Fiber Patch Transducers (SH-PFP) for SHM Applications**
---**Bernd Köhler**, Uwe Lieske, and Frank Schubert, Fraunhofer Institute for Ceramic Technologies and Systems, Branch Materials Diagnostics IKTS-MD, Dresden, Germany

11:10 AM **Multi-Parameter POD for a Guided Waves Based SHM Approach for Lightweight Materials**
---**A. Gianneo**, M. Carboni, and M. Giglio, Dipartimento di Meccanica, Politecnico di Milano, Via La Masa 1, 20156 Milano

11:30 AM ***Adjourn***

AUTHOR LISTING

*Session Chair