

September 25-28, 2016
Lisbon, Portugal

The 21ST INTERNATIONAL WORKSHOP ON
ELECTROMAGNETIC NONDESTRUCTIVE
EVALUATION

PRELIMINARY PROGRAM

Topics of interest: New developments in eNDE, Advanced eNDE sensors, Analytical and numerical modelling of eNDE, Inverse problems and signal processing, Material characterization, Monitoring and diagnoses of mechanical structures, Biomedical applications of eNDE, Innovative industrial applications of eNDE.





Program Schedule – Sunday, September 25th

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| Instituto Superior Técnico Main Building – Pavilhão Central Av. Rovisco Pais, N ^o 1, 1049-001 Lisboa | |
| 17:00 – 20:00 | Registration |
| | Welcome Reception |



Program Schedule – Monday, September 26th

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| Instituto Superior Técnico Congress Center Av. Rovisco Pais, N ^o 1, 1049-001 Lisboa | |
| 08:00 – 09:00 | Registration |
| 09:00 – 09:20 | Opening Ceremony |
| 09:20 – 09:40 | Invited Lecturer (1) |
| 09:40 – 10:20 | Invited Lecturer (2) |
| 10:20 – 10:40 | COFFEE BREAK |
| 10:40 – 12:00 | Oral Session 1: Advanced eNDE sensors |
| 12:00 – 13:00 | LUNCH & ISC meeting |
| 13:00 – 14:30 | Poster session |
| 14:30 – 16:30 | Oral session 2: Material characterization (1) |
| 16:30 – 16:45 | COFFEE BREAK |
| 16:45 – 18:25 | Oral Session 3: Material characterization (2) |

10:40 – 12:00 | Monday 26/09/2016

Oral Session 1: Advanced eNDE sensors

10:40 (22) Title: FUNDAMENTAL STUDY ON MAGNETIC FIELD SENSOR OPERATING AT HIGH TEMPERATURE

Authors: Katsufumi Honmyo and Hiroaki Kikuchi

11:00 (10) Title: A NOVEL TMR-BASED SENSOR IN DIRECT CURRENT FIELD MEASUREMENT FOR NONFERROUS METAL INSPECTION

Authors: Jikai Zhang, Donglin Li and Yihua Kang

11:20 (65) Title: DEVELOPMENT OF A FLEXIBLE FILM ELECTROMAGNETIC ACOUSTIC TRANSDUCER FOR NONDESTRUCTIVE TESTING

Authors: Cuixiang Pei, Pan Xiao and Zhenmao Chen

11:40 (79) Title: NOVEL DUAL-BAND CAVITY-BACKED ANTENNA DESIGN AND ITS APPLICATION TO SIMULTANEOUS RFID COMMUNICATIONS AND PARTIAL DISCHARGE MONITORING OF HIGH VOLTAGE FACILITIES

Authors: Wen-Hai, Zhang Kam-Weng Tam and Wen-Jun Lu

13:00 – 14:30 | Monday 26/09/2016

Poster Session

13:00 (8) Title: IMPEDANCE MATCHING USING VARIABLE CAPACITORS IN ELECTROMAGNETIC ULTRASONIC FLAW DETECTION

Authors: Yoshihiro Nishimura, Naoki Akimoto, Katsumi Fukuda, Takeharu Hayashi, Eiki Ikeda and Ginji Uchibe

(12) Title: MAGNETIC FLUX LEAKAGE TESTING METHOD FOR MICRO-CRACK IN BEARINGS USING INDUCTIVE MAGNETIC HEAD PROBES

Authors: Erlong Li, Yihua Kang, Yeliang Yan and Wenbo Wu

(13) Title: MAGNETIC NON-DESTRUCTIVE EVALUATION OF DUCTILE CAST IRON WITH A RETAINED CHILL CONTENT

Authors: Alexandr Stupakov, Takanori Matsumoto, Tetsuya Uchimoto, Gabor Vertesy and Toshiyuki Takagi

(15) Title: DEPENDENCY OF PULSED REMOTE FIELD EDDY CURRENT INSPECTION OF SUBSURFACE CORROSION IN FERROMAGNETIC DOUBLE-CASING PIPES ON PARAMETERS OF EXCITATION CURRENT

Authors: Yong Li, Xiyu Zhang and Wenjia Li

(17) Title: STUDY OF THE REVERSE MARTENSITIC TRANSFORMATION USING NON-DESTRUCTIVE ELECTROMAGNETIC AND MATERIALS CHARACTERIZATION TECHNIQUES

Authors: Adriana Savin, Javier Fava, Cristina Spinosa, Marta Ruch, Monica Landau, Guillermo Cosarinsky, Rozina Steigmann and Mihail Liviu Craus

(18) Title: SPATIALLY RESOLVED BARKHAUSEN NOISE MEASUREMENT OF LASER CUT ELECTRICAL STEELS

Authors: Michael Hübel, Ulana Cikalova and Rene Siebert

(20) Title: NDE & SHM OF TECHNICAL OBJECTS USING LOW-COST IMPEDANCE METHOD

Authors: Miroslaw Witos, Maciej Roskosz, Krzysztof Fryczowski and Zbigniew Hilary Zurek

(23) Title: 3D MODELING OF BIOMATERIAL MAGNETIC FIELD DUE TO ITS MECHANICAL PROCESSING

Authors: Vladimir Chudacik, Klara Capova, Milan Smetana and Lukas Behun

(25) Title: INFLUENCE OF AUSTENITIC STEELS DEFORMATION STRUCTURE ON MAGNETIC PROPERTIES RESPONSE

Authors: Milan Smetana, Klara Capova, Vladimir Chudacik and Peter Palcek

(26) Title: CRACK DEPTH ESTIMATION FROM SWEPT FREQUENCY EDDY CURRENT RESPONSE SIGNALS

Authors: Andrea Stubendekova, Ladislav Janousek and Milan Smetana

(29) Title: DETECTION OF THE SUB SURFACE CRACKS THROUGH THICK INSULATION USING PULSED EDDY CURRENT TECHNIQUE

Authors: Kim Kyeong-Ho, Matte Kishorebabu, Park Duckgun and Lee Deok-Hyun

(30) Title: IRRADIATION EMBRITTLEMENT EVALUATION OF RPV STEEL USING MICRO MAGNETIC METHODS

Authors: Matte Kishorebabu, Park Duckgun, Lee Cheolkyu and Lee Deok-Hyun

(31) Title: EMBEDDED ULTRASONIC SENSOR UNDER THE INSULATION FOR THE ON-LINE MONITORING OF THE PIPES IN HIGH TEMPERATURE

Authors: Seung Hyun Cho, Taehoon Heo and Hong Min Seung

(33) Title: REAL-TIME FLAW CHARACTERIZATION THROUGH LEARNING-BY-EXAMPLES TECHNIQUES: A COMPARATIVE STUDY APPLIED TO ECT

Authors: Shamim Ahmed, Roberto Miorelli, Marco Salucci and Andrea Massa

(37) Title: PROPOSAL OF MEASUREMENT INSTRUMENT FOR MEASUREMENTS OF THE METAL MATERIALS INTERNAL DAMPING BY DETERMINING THE QUALITY OF THE PIEZOELECTRIC ACCOUSTIC TRANSDUCER

Authors: Peter Fabo, Libor Trško, Dagmar Faktorová and Adriana Savin

(43) Title: EDDY CURRENT INDUCED BY PIPE ROTATION IN MFL TESTING AND ITS INFLUENCE ON TESTING SIGNAL

Authors: Bo Feng, Yihua Kang, Yanhua Sun and Jianbo Wu

(46) Title: INSPECTION OF BOILER WATER WALL TUBES USING ELECTROMAGNETIC INSPECTION TECHNIQUE. YESTERDAY (MANUAL) AND TODAY (AUTOMATED)

Authors: Ankit Vajpayee and David Russell

(47) Title: MULTI-MODALITY STRAIN ESTIMATION AND DATA PROCESSING USING AN IMPROVED SCANNING NEAR-FIELD MICROWAVE MICROSCOPIC IMAGING TECHNIQUE

Authors: Xiaodong Shi, Yiming Deng, Yongming Liu and James Merritt

(49) Title: VARIABLE BANDWIDTH CHOPPER AMPLIFIER FOR EDDY-CURRENT NON-DESTRUCTIVE TESTING

Authors: João Silva, David Oliveira, Diogo M. Caetano and Jorge Fernandes

(50) Title: DEVELOPMENT OF NA EDDY CURRENT TESTING SYSTEM FOR THE CHARACTERIZATION OF A HP AUSTENITIC STAINLESS STEEL

Authors: Monica Arenas, Gabriela Ribeiro Pereira, Tiago Rocha, Chandra Angani, Artur Lopes Ribeiro, Helena Geirinhas Ramos and Joao Marcos Alcoforado Rebello

(51) Title: EDDY CURRENT DIFFERENTIAL PROBE FOR TESTING COMPOSITE MATERIALS

Authors: Chandra Sekhar Angani, Artur Lopes Ribeiro, Helena Geirinhas Ramos, Dario Jerónimo Pasadas and Tiago Jorge Rocha

(52) Title: INSPECTION OF ILLUMINATION PILLARS USING ELECTROMAGNETIC ULTRASONIC GUIDED WAVE

Authors: Hiroyuki Nakamoto, Fumio Kojima, Daichi Nakamura, Arihiro Miwa, Yoshitaka Iwasaki and Hideaki Tomita

(53) Title: EDDY CURRENT AND MAGNETIC BARKHAUSEN NOISE MEASUREMENT TECHNIQUES AS THE TOOLS FOR EVALUATION OF MATERIAL PROPERTY CHANGES INDUCED BY METAL-WORKING

Authors: Stefan Borik, Ivo Cap, Miroslav Neslusan and Klara Capova

(54) Title: INSPECTION OF THE CREVICE REGION ON HEAT EXCHANGER TUBESHEET USING THE MIXING OF EDDY CURRENT SIGNALS

Authors: Joaquim Corte, Maria Cristina Areiza, Gabriela Pereira and João Marcos Rebello

(55) Title: DEVELOPMENT AND SIGNAL PROCESSING OF A MAGNETIC SENSOR FOR DETECTING AND SIZING PARAFFIN DEPOSITION INSIDE PIPELINES

Authors: João Vicente Rocha, Maria Cristina Areiza, Vitor Manoel Silva, Cesar Camerini, João Marcos Rebello and Gabriela Pereira

(56) Title: ACCELERATED NEARFIELD MICROWAVE MICROSCOPIC IMAGING FOR CHARACTERIZING PA-11 AND PE MATERIAL USING SPARSE SAMPLING

Authors: Deepak Kumar and Yiming Deng

(61) Title: NON-DESTRUCTIVE TESTING USING MICROWAVE IN TE MODE FOR DETECTING AXIAL CRACKS IN A METAL PIPE

Authors: Takuya Katagiri, Kota Sasaki, Noritaka Yusa and Hidetoshi Hashizume

(63) Title: MAGNETIC CHARACTERISATION OF MICROSTRUCTURAL FEATURE DISTRIBUTION IN STEELS BY HYSTERESIS MEASUREMENT AND MODELLING

Authors: Jun Liu, Claire Davis, John Wilson and Anthony Peyton

(67) Title: COMPARISON OF MOTION PATTERNS FOR LORENTZ FORCE EDDY CURRENT TESTING

Authors: Reinhard Schmidt, Jan M. Otterbach, Hartmut Brauer and Marek Ziolkowski

(69) Title: MATERIAL CHARACTERIZATION USING EDDY CURRENT TECHNIQUE AND SOLID STATE HALL EFFECT SENSOR

Authors: Patrick Inácio, Luis Sorger, Luísa Quintino, Alicia Páez, José Torralba and Telmo Santos

(70) Title: MONOTONICITY IMAGING METHOD IN EDDY CURRENT TESTING AND EXTRACTION OF TIME CONSTANTS

Authors: Zhiyi Su, Gaspare Giovinco, Lalita Udpa, Satish Udpa and Antonello Tamburrino

14:30 – 16:30 | Monday 26/09/2016

Oral Session 2: Material characterization (1)

14:30 (19) **Title:** NEW SENSOR DEVELOPMENT FOR BARKHAUSEN NOISE TECHNIQUE

Authors: Ulana Cikalova, Susanne Hillmann and Jürgen Schreiber

14:50 (27) **Title:** ELECTROMAGNETIC NONDESTRUCTIVE CHARACTERIZATION OF DIFFERENT STRIP GRATINGS STRUCTURES AS BIOACTIVE SURFACES

Authors: Adriana Savin, Nicoleta Iftimie, Rozina Steigmann, Marta Ruch, Dagmar Faktorova and Jakub Faktor

- 15:10 (40) Title:** EDDY CURRENT EVALUATION OF COLD WORKED AUSTENITIC STAINLESS STEEL
Authors: Vitor Manoel Silva, Cesar Camerini, Juan Carlos Blás, Juan Manuel Pardal and Gabriela Pereira
- 15:30 (62) Title:** NONDESTRUCTIVE EVALUATION OF STRUCTURAL CHANGE DUE TO CREEP DEGRADATION IN P91 STEEL BY MICROMAGNETIC PROPERTIES
Authors: Takanori Matsumoto, Tetsuya Uchimoto, Toshiyuki Takagi, Klaus Szielasko and Madalina Rabung
- 15:50 (4) Title:** A NDT & E METHODOLOGY BASED ON MAGNETIC REPRESENTATION FOR SURFACE TOPOGRAPHY OF FERROMAGNETIC MATERIALS
Authors: Yanhua Sun and Shiwei Liu
- 16:10 (44) Title:** EMERGING PLASTIC AND COMPOSITE MATERIALS CHARACTERIZATION AND DAMAGE DIAGNOSIS USING MICROWAVE-INDUCED THERMO-ACOUSTIC IMAGING
Authors: Mohand Alzuhiri, Ryan Jacobs, Yiming Deng and Mark Golkowski

16:45 – 18:45 | Monday 26/09/2016

Oral Session 3: Material characterization (2)

- 16:45 (6) Title:** CALIBRATION PROCEDURE OF BARKHAUSEN NOISE TECHNIQUE FOR MONITORING GRINDING DAMAGE OF CASE-HARDENED SURFACES
Authors: Miroslav Neslušán, Kamil Kolařík, Róbert Farda and Mária Čilliková
- 17:05 (38) Title:** IMAGING WELD CROSS-SECTION USING EDDY CURRENT TESTING
Authors: Hanyang Xu, Ziqiang Cui, Anthony Peyton, Matthew Roy and Wuliang Yin
- 17:25 (59) Title:** NONDESTRUCTIVE CHARACTERIZATION OF DIELECTRIC MATERIALS WITH SCANNING TERAHERTZ SPECTROSCOPY
Authors: Klaus Szielako, Maryam Manavipour, Christopher Stumm and Kota Sasaki

17:45 (75) Title: MATERIAL CHARACTERIZATION OF FERROMAGNETIC SAMPLES VIA ELECTROMAGNETIC METHODS

Authors: Massimiliano D'aquino, Simone Minucci, Carlo Petrarca, Guglielmo Rubinacci, Antonello Tamburrino and Salvatore Ventre

18:05 (72) Title: SIGNAL COMPONENTS SELECTION IN MULTI-FREQUENCY EDDY CURRENT TESTING

Authors: Marco Laracca, Luigi Ferrigno, Marco Ricci and Giuseppe Silipigni



Program Schedule – Tuesday, September 27th

| Instituto Superior Técnico Congress Center Av. Rovisco Pais, Nº1, 1049-001 Lisboa | |
|--|--|
| 08:00 – 08:30 | Registration |
| 08:30 – 10:10 | Oral Session 4: New developments in eNDE (1) |
| 10:10 – 10:25 | COFFEE BREAK |
| 10:25 – 12:25 | Oral Session 5: New developments in eNDE (2) |
| 12:25 – 13:30 | LUNCH |
| 13:30 – 14:00 | Keynote Speaker |
| 14:00 – 15:40 | Oral session 6: Analytical and numerical modelling of eNDE Inverse problems and signal processing |
| 16:15 | BUS TO GALA DINNER |
| 16:15 – 23:00 | GALA DINNER |

08:30 – 10:10 | Tuesday 27/09/2016

Oral Session 4: New developments in eNDE (1)

- 08:30 (58) Title:** MECHANISM STUDY OF EDDY CURRENT TESTING SIGNALS CHANGE BY HEAT TREATMENT
Authors: Tetsuya Uchimoto and Toshiyuki Takagi
- 08:50 (11) Title:** EFFECT OF SCAN VELOCITY ON ULTRA-LOW FREQUENCY EDDY CURRENT TEST MEASUREMENTS
Authors: Chaofeng Ye, Zhiyi Su, Lalita Udpa and Satish Udpa
- 09:10 (16) Title:** DEVELOPMENT OF PULSED EDDY CURRENT TECHNIQUE FOR TESTING THICK STAINLESS STEEL PLATES
Authors: Sambasiva Rao Kambala, Purna Chandra Rao B, Thirunavukkarasu S. and Mahadevan S.
- 09:30 (60) Title:** LOW FREQUENCY EDDY CURRENT TESTING TO MEASURE THICKNESS OF DOUBLE LAYER PLATES MADE OF NONMAGNETIC STEEL
Authors: Naoki Tajima, Noritaka Yusa and Hidetoshi Hashizume
- 09:50 (74) Title:** COMPOSITE DEFECTS EVALUATION USING THE HYBRID NDT METHODS OF PECT AND EMAT
Authors: Shejuan Xie, Mingming Tian, Cuixiang Pei, Hong-En Chen and Zhenmao Chen

10:25 – 12:25 | Tuesday 27/09/2016

Oral Session 5: New developments in eNDE (2)

- 10:25 (3) Title:** THE APPLICATION OF 3D PRINTING TECHNOLOGY TO FABRICATE AN IMITATIVE CRACK FOR ELECTROMAGNETIC NDT&E STUDIES
Authors: Noritaka Yusa, Weixi Chen and Hidetoshi Hashizume
- 10:45 (66) Title:** MOTION-INDUCED EDDY CURRENT TESTING OF GLARE LAMINATES
Authors: Hartmut Brauer, Stephan Gorges and Marek Ziolkowski

- 11:05 (28) Title:** MAGNETIC NONDESTRUCTIVE EVALUATION OF NEUTRON IRRADIATED RPV STEEL
Authors: Park Duckgun, Matte Kishorebabu, Lee Deok Hyun and Son Derac
- 11:25 (39) Title:** ANALYSIS OF STRESS'S INFLUENCED ON METAL MAGNETIC MEMORY SIGNAL
Authors: Hongmei Li and Zhenmao Chen
- 11:45 (73) Title:** EVALUATION OF PLASTIC DEFORMATION IN CARBON STEEL BASED ON AC MFL METHOD CONSIDERING THE EFFECTS OF TEMPERATURE AND ROLLING DIRECTIONS
Authors: Hong-En Chen, Shejuan Xie and Zhenmao Chen
- 12:05 (68) Title:** CUSTOMIZED EDDY CURRENT PROBE FOR PIPES INSPECTION
Authors: Miguel Machado and Telmo Santos

14:00 – 15:40 | Tuesday 27/09/2016

**Oral Session 6: Analytical and numerical modelling of eNDE
Inverse problems and signal processing**

- 14:00 (7) Title:** FROM SMALL-SCALE MODELING TO IMAGING OF DISORGANIZED PERIODIC STRUCTURES
Authors: Zi-Cheng Liu, Chang-You Li, Dominique Lesselier and Yu Zhong
- 14:20 (34) Title:** FAST SIMULATION TOOLS DEDICTED TO EDDY CURRENT INSPECTION OF TUBES IN PRESENCE OF EXTERNAL DEPOSIT OR SUPPORT PLATE
Authors: Theodoros Theodoulidis and Christophe Reboud
- 14:40 (78) Title:** FAST MODEL OF TRANSIENT ELECTROMAGNETIC RESPONSE TO GEOLOGIC STRUCTURES AHEAD OF TUNNEL FACE
Authors: Lanbo Liu, Qinghua Huang, Shucal Li and Huaifeng Sun
- 15:00 (21) Title:** ON A BAYESIAN INVERSION APPROACH IN EDDY-CURRENT TESTING
Authors: Caifang Cai, Marc Lambert, Thomas Rodet and Dominique Lesselier
- 15:20 (36) Title:** EVALUATION OF PROBABILITY OF DETECTION CURVES IN NON-STANDARD CASES: APPLICATION TO EDDY CURRENT TUBE INSPECTION



Program Schedule – Wednesday, September 28th

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| Instituto Superior Técnico Congress Center Av. Rovisco Pais, N ^o 1, 1049-001 Lisboa | |
| 08:30 – 10:10 | Oral Session 7: Monitoring and diagnoses of mechanical structures |
| 10:10 – 10:25 | COFFEE BREAK |
| 10:25 – 12:25 | Oral Session 8: Innovative industrial applications of eNDE |
| 12:25 – 13:35 | LUNCH |
| 13:35 | Closing Ceremony |

08:30 – 10:10 | Wednesday 28/09/2016

Oral Session 7: Monitoring and diagnoses of mechanical structures

08:30 (32) Title: MONITORING MICROSTRUCTURAL CHANGES IN GRADE 91 STEEL COMPONENTS THROUGH MAGNETIC MEASUREMENTS

Authors: John Wilson

08:50 (48) Title: COVER DEPTH DETECTION OF STEEL REINFORCING BAR USING ELECTROMAGNETIC METHOD

Authors: Dongfeng He, M. Shiwa, S. Takaya and K. Tsuchiya

09:10 (9) Title: EDDY CURRENT SENSORS AND INVERSION TECHNIQUES FOR ESTIMATION THE CONDUCTIVITY PROFILE OF THE GRAPHITE BRICKS IN AN ADVANCED GAS-COLOLED REACTOR CORE

Authors: Henok Tesfalem, Anthony Peyton, Adam Fletcher, Matthew Brown and Bob Chapman

09:30 (14) Title: A MAGNETOSTRICTIVE EMAT MEASURING TORSIONAL VIBRATION FOR SOLID SHAFT MONITORING

Authors: Hong Min Seung, Jun Kyu Lee, Chung Il Park, Joo Kyung Lee, Do Hyeong Lim, Seung Hyun Cho and Yoon Young Kim

09:50 (24) Title: NON-CONTACT STRUCTURAL HEALTH MONITORING OF ROTATING COMPONENTS USING INDUCTIVE SENSOR AND TIME OF ARRIVAL SIGNAL

Authors: Miroslaw Witos, Mariusz Zieja and Jaroslaw Kozdra

10:25 – 12:25 | Wednesday 28/09/2016

Oral Session 8: Innovative industrial applications of eNDE

10:25 (5) Title: INSPECTION OF DIESEL ENGINE INJECTORS BY SEVERAL NONDESTRUCTIVE METHODS

Authors: Gabor Vertesy, Peter Henry Balassa, Antal Gasparics and Ivan Tomas

10:45 (41) Title: DETECTING FAILURES IN STEEL SUBSTRATE COATED WITH ANTICORROSIVE COMPOSITES USING THE EDDY CURRENT TECHNIQUE

Authors: Gabriela Pereira, Isabel Margarrit-Mattos, João Marcos Rebello, Clara Johanna Pacheco, Marcella Grosso, André Mascarenhas, Monica Arenas and Damasceno Soares

11:05 (45) Title: OPTIMIZATION OF AN EDDY CURRENT PATTERN ON KAPTON WITH LOW SENSITIVITY TO LIFT-OFF

Authors: Jean-Marc Decitre

11:25 (76) Title: ANOTHER POSSIBILITY OF MAGNETIC CAMERA; GUIDING THE ULTRASONIC PROBE IN THE CONTINUOUS AUTOMATIC B-SCAN INSPECTION

Authors: Minh Huy Le, Jungmin Kim and Jinyi Lee

11:45 (71) Title: APPLICATION OF ELECTROMAGNETIC NON-DESTRUCTIVE TESTING METHODS IN ART CONSERVATION

Authors: Tomasz Chady and Przemyslaw Manna

12:05 (57) Title: NON INVASIVE EVALUATION OF YOGURT FORMATION USING A CONTACTLESS RADIOFREQUENCY TECHNIQUE

Authors: Thi Hong Nhung Dinh, Thierry Bore, Stephane Serfaty and Pierre-Yves Joubert

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