



- Institute of Fundamental Technological Research •
 - Polish Academy of Sciences •
 - Warsaw • Poland •
-
-

CONFERENCE
PROCEEDINGS

4

Nondestructive Testing
of Materials and Structures II

AMAS Workshop – NTM'03
Warsaw, May 19-21, 2003

edited by

Julian Deputat
and

Zbigniew Ranachowski



Centre of Excellence for
Advanced Materials and Structures

WARSAW 2003



Copyright by | Institute of Fundamental Technological Research
Polish Academy of Sciences

AMAS CONFERENCE PROCEEDINGS

Series Editors:

Executive Committee of AMAS:

Zenon Mróz (*Scientific Coordinator*)

Krzysztof Doliński

Wojciech Nowacki

Henryk Petryk

Andrzej Siemaszko

Kazimierz Sobczyk

Executive Editor:

Józef Joachim Telega

*Production of this volume has been partially supported
by the European Commission*

Published and distributed by

Institute of Fundamental Technological Research
Świętokrzyska 21, 00-049 Warszawa, Poland

ISSN 1730-1521

Papier offset. kl. III, 70 g, B1

Ark. wyd.: 18; ark. druk.: 13,5

Skład w systemie L^AT_EX: T.G. Zieliński

Oddano do druku i druk ukończono: XI 2003

Druk i oprawa: Drukarnia Braci Grodzickich, Piaseczno, ul. Geodetów 47a

Foreword

The Workshop is a continuation of the previous one, held in 2002 under the title “*Nondestructive Testing of Materials and Structures*”. It is aimed at presentation of the state-of-the-art of nondestructive methods related to structures, properties, quality assessment and modelling of response of advanced materials, including texture of construction materials and food products. It is addressed to students and researchers in the areas of material science and properties of materials and structures. The separate session is dedicated to the problems related to application of acoustic methods in food technology. The lectures are concerned with such NDT methods as:

- ultrasonic,
- electromagnetic,
- acoustic emission,
- vibration measurements,
- radiography
- visual.

Contents

List of Participants	7
Invited Lectures	11
E. SCHNEIDER and R. HERZER, <i>Ultrasonic analysis of texture and characterization of materials properties and behaviour influenced by texture</i>	13
T. STĘPIŃSKI, <i>Ultrasonic phased arrays</i>	35
D. UTRATA, <i>The Center for NDE at Iowa State University and industrial inspection interactions of the Iowa Demonstration Laboratory</i> .	53
G. ROUDAUT, <i>Low moisture cereal products: texture changes versus hydration</i>	77
Contributed Papers	91
P.P. LEWICKI, E. GONDEK, and Z. RANACHOWSKI, <i>Influence of water activity on acoustic emission of breakfast cereals</i>	93
A. MARZEC, P.P. LEWICKI, Z. RANACHOWSKI, and T. DĘBOWSKI, <i>Cereal food texture evaluation with application of mechanical and acoustical methods</i>	111
F. REJMUND, P. GUTKIEWICZ, Z. PEŚKI, and K. RADWAN-WIATROWSKI, <i>Automatic ultrasonic testing of girth welds in thin wall pipelines</i>	133
P. ONISZK , <i>Non-contact testing of wearing processes in airborne power generators</i>	149
S. MACKIEWICZ, <i>Theoretical model for calculation of elastic coefficients of composite materials based on polycrystalline diamond and cubic boron nitride</i>	159

- P. RANACHOWSKI, F. REJMUND, A. PAWELEK, and A. PIĄTKOWSKI, *Structural and acoustic investigation of the quality and degradation processes of electrotechnical insulator porcelain under compressive stress* 179
- M. ROJEK, J. STABIK, G. WRÓBEL, *Ultrasonic methods in diagnostics of epoxy-glass composites* 197
- M. ALEKSIEJUK and M.A. KNYAZEV, *Nonharmonic polarization study of ferroelectric ceramics in alternating field* 207

List of Participants

Name	Institution
<i>Invited Lecturers:</i>	
E. SCHNEIDER Schneider@fhg.izfp.de	Fraunhofer Institut für Zerstörungsfreie Prüfverfahren, Saarbrücken, Germany
T. STĘPIŃSKI ts@signal.uu.se	Uppsala University, Sweden
K. LANGENBERG langenberg@uni-kassel.de	Universität Kassel, Germany
G. MOOK mook@mb.uni-magdeburg.de	Universität Magdeburg, Germany
D. UTRATA heydave@cnde.iastate.edu	Center for Nondestructive Evaluation, Iowa University, USA
G. ROUDAUT gaelle.roudaut@u-bourgogne.fr	Universite de Bourgogne, Dijon, France
<i>Lecturers:</i>	
P.P. LEWICKI gondek@alpha.sggw.waw.pl	Warsaw Agricultural University, Poland
A. MARZEC marzec.danak@alpha.sggw.waw.pl	Warsaw Agricultural University, Poland
P. GUTKIEWICZ pgutkie@ippt.gov.pl	Institute of Fundamental Technological Research, Warsaw, Poland
P. ONISZK witu@witu.mil.pl	Military Institute of Armament Technology, Zielonka Poland
S. MACKIEWICZ smackie@ippt.gov.pl	Institute of Fundamental Technological Research, Warsaw, Poland
P. RANACHOWSKI pranach@ippt.gov.pl	Institute of Fundamental Technological Research, Warsaw, Poland
M. ROJEK Maciej.Rojek@polsl.gliwice.pl	Silesian Technical University, Gliwice, Poland
M.A. KNYAZEV knyazev@iaph.bas-net.pl	National Academy of Sciences of Belarus, Minsk, Belarus

Name	Institution
<i>Participants:</i>	
Z. MRÓZ zmroz@ippt.gov.pl	Institute of Fundamental Technological Research, Warsaw, Poland
H. PETRYK hpetryk@ippt.gov.pl	Institute of Fundamental Technological Research, Warsaw, Poland
K. DOLIŃSKI kdolin@ippt.gov.pl	Institute of Fundamental Technological Research, Warsaw, Poland
J. SZELAŻEK jszela@ippt.gov.pl	Institute of Fundamental Technological Research, Warsaw, Poland
T. DĘBOWSKI tdebo@ippt.gov.pl	Institute of Fundamental Technological Research, Warsaw, Poland
E. BENKO Ewa.Benko@ios.krakow.pl	Institute of Metal Cutting, Cracow, Poland
P. KLIMCZYK Piotr.Klimczyk@ios.krakow.pl	Institute of Metal Cutting, Cracow, Poland
E. GONDEK gondek@alpha.sggw.waw.pl	Agricultural University, Warsaw, Poland
D. SZEWCZYK	Institute of Electrotechnics, Warsaw, Poland
B. ZAJĄC	ITWL, Warsaw, Poland
J. MOTTL	Polish Airlines LOT, Warsaw, Poland
M. DOBROWOLSKI udt@udt.gov.pl	Office of Technical Inspection, Warsaw, Poland
Cz. DYBIEC	Institute of Precision Mechanics, Warsaw, Poland
A. LEWIŃSKA-ROMNICKA lewinska@chtr.pw.edu.pl	Warsaw University of Technology, Warsaw, Poland
M. ALEKSIEJUK maleks@ippt.gov.pl	Institute of Fundamental Technological Research, Warsaw, Poland
J. KASPERKIEWICZ jkasper@ippt.gov.pl	Institute of Fundamental Technological Research, Warsaw, Poland
D. JÓŻWAK-NIEDŹWIEDZKA	Institute of Fundamental Technological Research, Warsaw, Poland
A. LITOROWICZ	Institute of Fundamental Technological Research, Warsaw, Poland

Name	Institution
D. ALTERMAN	Institute of Fundamental Technological Research, Warsaw, Poland
D. ZAŁOCHA dzaloch@ippt.gov.pl	Institute of Fundamental Technological Research, Warsaw, Poland
M. ZIELIŃSKI mzielin@ippt.gov.pl	Institute of Fundamental Technological Research, Warsaw, Poland
Z. ŁAPIŃSKI witu@witu.mil.pl	Military Institute of Armament Technology, Zielonka, Poland
J. KORZENIOWSKI witu@witu.mil.pl	Military Institute of Armament Technology, Zielonka, Poland
M. PARFINOVA	Chemical Institute of Modern Materials, Minsk, Belarus
I. PARIBOK	Chemical Institute of Modern Materials, Minsk, Belarus
M. SKŁODOWSKI msklod@ippt.gov.pl	Institute of Fundamental Technological Research, Warsaw, Poland
A. LISSOWSKI	Computer Unit, Autism Nat. Soc., Warsaw, Poland ,
R. WOJNAR rwojnar@ippt.gov.pl	Institute of Fundamental Technological Research, Warsaw, Poland