

ISSN: 2603-4018
eISSN: 2603-4646

INTERNATIONAL JOURNAL

for science, techniques and innovation
for non-destructive inspection
and material evaluation for the industries



NDT DAYS

Volume III / Issue 4

Year 2020

Published by Bulgarian Society for Non-Destructive Testing
Member of ICNDT and EFNDT

International Journal “NDT Days”

ISSN: 2603-4018, eISSN: 2603-4646

PUBLISHER: Bulgarian Society for NDT (BG S NDT)

FOUNDERS: Bulgarian Society for NDT, Institute of Mechanics at the Bulgarian Academy of Sciences

The scope of the journal is aimed to all methods and techniques of non-destructive and destructive testing, as well as evaluation of materials and structures in all areas of technical activities. It is an opportunity to publish research and development results, together with good practices and recommendations for standardization.

Submitted manuscripts should not have been published previously and should not be currently under consideration for publishing elsewhere. They should be prepared in accordance with the Instructions for Authors, published on the journal site.

The articles appearing in the Journal are indexed in NDT Net.

THEMATIC FIELDS

1. Non-destructive inspection methods

- Non-destructive testing methods (ultrasonic, penetrant, magnetic, visual, infrared thermography, radiography, leak, etc.);
- Non-destructive and destructive inspection of the integrity, structure and physico-mechanical properties of materials;
- Application of non-destructive and destructive testing methods for inspection in energy, transport, engineering, construction, chemical industry, etc.;
- Structural health monitoring of equipment and structures with non-destructive testing methods (vibration diagnostics, acoustic emission, infrared thermography, etc.);
- Advanced non-destructive testing methods and techniques (phased array, TOFD, computer and digital radiography, tomography, automatic system for inspection, shearography, etc.);
- Training, certification, accreditation and standardization in scope of non-destructive inspection and conformity assessment of materials, equipment and structures.

2. Techniques for material processing and condition monitoring of equipment

- Design and construction;
- Life cycle condition monitoring;
- Material sciences;
- Manufacturing, exploitation, maintenance and repair;
- Innovation methods and techniques for modernization;
- Metal casting, welding, soldering bonding, machining, surface treatment;
- Mathematical modeling of technological processes;
- Load treatment and deformation;
- Training.

OFFICIAL LANGUAGES: Bulgarian, English and Russian

EDITORIAL BOARD

EDITOR IN CHIEF

Mitko MIHOVSKI, President of BG S NDT, Sofia, Bulgaria

DEPUTY EDITOR IN CHIEF

Peter DJONDJOROV, Institute of Mechanics at the Bulgarian Academy of Sciences, Sofia, Bulgaria

SCIENTIFIC SECRETARIES

Yordan MIRCHEV, Institute of Mechanics at the Bulgarian Academy of Sciences, Sofia, Bulgaria

Krassimira IVANOVA, Institute of Mathematics and Informatics at the Bulgarian Academy of Sciences, Sofia, Bulgaria

MEMBERS

Victor CHIRIKOV, Technical University of Varna, Varna, Bulgaria

Pavel CHUKACHEV, Multitest Ltd., Varna, Bulgaria

Dimitar DIMOV, University of Architecture, Civil Engineering and Geodesy, Sofia, Bulgaria

Hristo DRAGANCHEV, Technical University – Varna, Varna, Bulgaria

Grigori DYMkin, Emperor Alexander I St. Petersburg State Transport University, Saint-Petersburg, Russia

Borislav GENOV, Defence Institute “Prof. Tsvetan Lazarov”, Sofia, Bulgaria

Ivan GEORGIEV, Institute of Information and Communication Technologies at the Bulgarian Academy of Sciences, Sofia, Bulgaria

Eduard GORKUNOV, Institute of Engineering Science, Ural Branch of the Russian Academy of Science, Ekaterinburg, Russia

Janez GRUM, University of Ljubljana, Slovenia

Yonka IVANOVA, Institute of Mechanics at the Bulgarian Academy of Sciences, Sofia, Bulgaria

Vasil KAVARDJIKOV, Institute of Mechanics at the Bulgarian Academy of Sciences, Sofia, Bulgaria

Ivan KOLAROV, Todor Kableshev University of Transport, Sofia, Bulgaria

Vladimir KOSTIN, M.N. Mikheev Institute of Metal Physics of Ural Branch of Russian Academy of Sciences; Yekaterinburg, Russia

Vadim KOVTUN, Gomel Branch of the University of Civil Protection of the Ministry for Emergency Situations of the Republic of Belarus, Gomel, Belarus

Sergey KRIVOSHEEV, Peter the Great Polytechnic University, Saint Petersburg, Russia

Emil MANOAH, Institute of Mechanics at the Bulgarian Academy of Sciences, Sofia, Bulgaria

Svetozar MARGENOV, Institute of Information and Communication Technologies at the Bulgarian Academy of Sciences, Sofia, Bulgaria

Boris MIHAYLOV, SPECTRI Ltd, Sofia, Bulgaria

Giuseppe NARDONI, International Academy on NDT, Brescia, Italy

Alexander NAZARYTHEV, Federal State Educational Establishment “PEIPK”, Saint Petersburg, Russia

Amos NOTEA, Technion, Israel Institute of Technology, Haifa, Israel

Anna POVOLOTSKAYA, Institute of Engineering Science, Ural Branch of the Russian Academy of Science, Ekaterinburg, Russia

Vladimir PROHOROVICH, ITMO University, Saint Petersburg, Russia

Nikolay RAZYGRAEV, State Reseach Center of Russian Federation CNIITMASH, Moscow, Russia

Vladimir SERGIENKO, V.A. Belyi Metal-Polymer Research Institute of the NAS of Belarus”, Gomel, Belarus

Yossi SHOEF, Israeli National Society for NDT, Tel Aviv, Israel

Alexandar SKORDEV, Certification Center for NDT Personnel at the Bulgarian Society for NDT, Bulgaria

Marin STOYCHEV, Institute of Metal Science, Equipment, and Technologies with Hydro- and Aerodynamics Centre “Acad. A. Balevski”, Sofia, Bulgaria

Maciej SULOWSKI, AGH University of Science and Technology, Krakow, Poland

Alexey TADJIBAEV, Federal State Educational Establishment “PEIPK”, Saint Petersburg, Russia

Vasily TITKOV, Peter the Great Polytechnic University, Saint Petersburg, Russia

Vladimir TROITSKY, E. O. Paton Electric Welding Institute of the NAS of Ukraine, Kiev, Ukraine

Valeriy VENGRINOVICH, Institute of Applied Physics of the NAS of Belarus, Minsk, Belarus

EDITORIAL OFFICE: International Journal “NDT Days”
Institute of Mechanics, Bulgarian Academy of Sciences
Acad. G. Bonchev Str., Block 4, Sofia – 1113, Bulgaria
phone: +359 2 9797120
e-mail: ndtdays@abv.bg
<http://www.bg-s-ndt.org/journal.html>

Publishing of Volume III (2020) of the International Journal “NDT Days” is partially financed by TU-Varna under the project NF-7/2020

Table of Contents

Linear Synthesis of Uniform Anaxial Eddy Current Probes with a Volumetric Structure of the Excitation System	184
Ruslana V. TREMBOVETSKA, Volodymyr Ya. HALCHENKO, Volodymyr V. TYCHKOV, Anatolii V. STORCHAK	
Линейный синтез анаксиальных однородных вихретоковых преобразователей с объемной структурой системы возбуждения	
Руслана В. ТРЕМБОВЕЦКАЯ, Владимир Я. ГАЛЬЧЕНКО, Владимир В. ТЫЧКОВ, Анатолий В. СТОРЧАК	
Martensitic Transformations in High Alloy Fe-Ni Alloys	191
Stoyan PARSHOROV, Evgeni MACHEV, Petar PETROV, Stefan VALKOV	
Phase Composition and Microstructure of Fe-12% Mn and Fe-20% Ni Alloy after Hot Plastic Deformation.....	196
Stoyan PARSHOROV, Evgeni MACHEV, Petar PETROV, Stefan VALKOV	
Investigation of the Micro-Structural Parameters of Iron Alloys	200
Stoyan PARSHOROV, Petar PETROV, Stefan VALKOV	
A Predictable Model for Structure Formation during Crystallization of Unconventional Steel.....	205
Rositsa GAVRILOVA, Svetla YANKOVA, Velichka LAZAROVA, Rozina YORDANOVA	
Прогнозен модел за формиране на структурата при кристализация на неконвенционална стомана	
Росица ГАВРИЛОВА, Светла ЯНКОВА, Величка ЛАЗАРОВА, Розина ЙОРДАНОВА	
Optimization of Hydraulic Press for Discrete Extrusion ПХДЕ4000/1000 via Pyrometer ПЛ-92.....	213
Deyan GRADINAROV, Nuray HASAN, Stoil TODOROV, Yuri BIJEV	
Оптимизация на хидравлична преса за дискретна екструзия ПХДЕ4000/1000 чрез пирометър ПЛ-92	
Деян ГРАДИНАРОВ, Нурай ХАСАН, Стоил ТОДОРОВ, Юри БИЖЕВ	
Apparatus for Real-time Monitoring of Welding Parameters.....	218
Deyan GRADINAROV, Yuri BIJEV, Stoil TODOROV	
Апарати за следене на заваръчни параметри в реално време	
Деян ГРАДИНАРОВ, Юри БИЖЕВ, Стоил ТОДОРОВ	
Partial Oxidation of Biocompatible Titanium Alloy Ti 6Al 4V During Deposition of Glassy Carbon Coating.....	225
Vladimir PETKOV, Mihaela ALEKSANDROVA, Radoslav VALOV	
Multimodel Approach for Defects Evaluation in Infrared Diagnostics of the Steel Ladle....	231
Ivanka S. PETROVA, Emil MIHAILOV	
Мултимоделен подход за оценяване на дефекти при инфрачервена диагностика на стената на стоманоразливна кофа	
Иванка ПЕТРОВА, Емил МИХАЙЛОВ	
Assessment of the Current Condition of the Steel Ladle's Wall.....	240
Ivanka S. PETROVA, Emil MIHAILOV	
Оценка на текущото състояние на стената на стоманоразливна кофа	
Иванка ПЕТРОВА, Емил МИХАЙЛОВ	