Transilvania University of Brasov

FACULTY OF MECHANICAL ENGINEERING

The 10th International Conference on ADVANCED COMPOSITE MATERIALS ENGINEERING - COMAT 2024

The 48th International Conference on MECHANISC OF SOLIDS 'P.P. TEODORESCU'

FINAL PROGRAMME

IN ASSOCIATION WITH:

ACADEMY OF TECHNICAL SCIENCES OF ROMANIA

SCHAEFFLER ROMANIA

THE ROMANIAN ACOUSTIC SOCIETY

RESEARCH INSTITUTE FOR CONSTRUCTION EQUIPMENT AND TECHNOLOGY – ICECON S.A.

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Brașov, ROMANIA, 22-23 October 2024

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MAIN TOPICS

- Composite Application in Automotive Engineering
- Ceramic Matrix Composites and Applications in Power Engines
- Environment and Renewable Energy
- Composites in Civil Engineering
- Composites in Transportation
- Damage and Fatigue of Composites and Applications in Automotive Industry
- Fibers
- Fracture and Failure in Composites
- Interface
- Mechanical Properties of Composites
- Metal Matrix Composites
- Modelling
- Nano-composites
- Natural Composites – Bio-materials
- Non-Destructive Testing of Composites
- Polymer Matrices
- Smart Composites
- Composite Materials in Bio-mechanics Industrial Applications
- Material behavior including bond, durability, fatigue and long-term performance

- Fabrication, processing and testing methods
- Full-scale testing
- Analysis and design
- Applications in wood, masonry and steel structures
- Structural shapes and fully composite systems with Applications in Automotive Engineering
- Innovative structural systems
- Sustainability and life-cycle

Tuesday, October 22nd 2024

09^{00}-09^{30} - Registration

09^{30}-09^{45}- Opening speeches

10^{00} -12^{45} - Invited Lectures

12^{45}-14^{30} - Lunch Break

14^{30}-16^{30} - Technical Session

16^{30}-17^{00} – Coffee Break

17^{00} -18^{30} - Technical Session

Wednesday, October 23rd 2024

09^{00}-10^{00} - The 48th International Conference on MECHANICS OF SOLIDS - "P.P. Teodorescu"

The 10th International Conference on ADVANCED COMPOSITE MATERIALS ENGINEERING

COMAT 2024

Tuesday, October 22nd 2024

9:00 – 9:30

Registration

9:30 – 09:45 – the "Aula" Building, room UI7

Opening speeches

- Prof. PhD Eng. Hab. **Maria Luminița SCUTARU**, Head of Department of Mechanical Engineering, Faculty of Mechanical Engineering, Transilvania University of Brașov, Romania.

09:45 -12:45 – the "Aula" Building, room UI7

Invited Speakers

CHAIRMAN:

Assoc.Prof. PhD Eng. Mircea MIHĂLCICĂ

- PhD Fiz. **Adriana SAVIN**, National R&D Institute for Physics – IFT, Iași, Romania

  ASSESSMENT OF ZIRCONIA THERMAL BARRIER COATINGS ON AUSTENITIC STEEL

- Prof. PhD Eng. **Andrei VASILESCU**, Technical University of Construction, Bucharest, Romania

  PROF. PHD DOC. ENG. HC. **PETRE P. TEODORESCU**, IN MEMORIAM

- Prof. Habil. PhD Eng. **Ovidiu VASILE**, Politehnica University, Bucharest, Romania

  SOUND-ABSORBING MATERIALS FOR ACOUSTIC PANELS (MINERAL WOOL, POLYURETHANE, POLYSTYRENE)

- Prof. Habil. PhD Eng. **Silviu NĂSTAC**, Dunărea de Jos University, Galați, Romania

  SUSTAINABLE SOUNDPROOFING MATERIALS BASED ON FOAM FORMED CELLULOSE FIBRES

12.45 – 14.30

Lunch Break

14.30 – 16.30 – the "Aula" Building, room UI7

Technical Session I

CHAIRMAN:

Prof. PhD Eng. Hab. Călin ITU

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  ABOUT SIMULATION OF VIBRATORY COMPACTION EQUIPMENT WITH COMPOSITE MATERIALS INCORPORATED

- **Miron D.S., Debeleac C.N., Nechita P., Căpățână G.F., Dobrescu C.F., Calu M.**

  ADVANCES OF COMPOSITE MATERIALS IN COMPACTION EQUIPMENTS FABRICATION. A REVIEW

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  METHOD TO RECYCLE CORRUGATED CARDBOARD IN ECO-FRIENDLY COMPOSITES

- **Gall R., Stanciu M.D., Savin A.**

  VISCOUS-ELASTIC PROPERTIES OF VARNISHED WOOD

- **Savin A., Steigmann R., Dobrescu S.G., Moraras C.**

HYBRID BIOCOMPOSITES: PROPERTIES AND PERFORMANCE FOR EXOSKELETON APPLICATIONS

14.30 – 16.30 – the "Aula" Building, room UI6

Technical Session II

CHAIRMAN:

Lect. PhD Eng. Maria Violeta GUIMAN

- **Ion D., Pandele R., Cotoban A.**

  EVALUATION OF OPERATING PERFORMANCE AT FLOW AND PRESSURE, WITH NOMINAL VALUES FOR VENTILATION PIPING

- **Ion D., Cotoban A.**

  TECHNICAL SOLUTIONS FOR EQUIPPING FLUID PIPELINES UNDER PRESSURE

- **Vasile O., Sescu-Gal C.**

  EVALUATION OF FATIGUE RESISTANCE OF COUPLERS FOR CONCRETE STEEL BARS FOLLOWING NORMATIVE REQUIREMENTS

- **Bratu P., Vasile O., Drăgan N., Năstac S.**

  EVALUATION OF THE STIFFNESS AND DAMPING OF ELASTOMERIC ISOLATORS

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CHAIRMAN:

Prof. PhD Eng. Hab. Ovidiu VASILE

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- **Cotoban A., Ion D., Pandele R.**

  ANALYSIS OF THE ACOUSTIC SPECTRUM AND VIBRATIONS OF FLUID TRANSPORT PIPELINES IN TURBULENT FLOW EQUIPPING NUCLEAR-ELECTRIC POWER PLANTS FOR SEISMIC ACTIONS

- **Bratu P., Vasile O., Zlătoianu S.**

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- **Bratu P., Vasile O., Ghinea A., Ion D., Zlătoianu S., Scorțea J.**

  TESTING THE PREFABRICATED BEAMS IN SITU

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CHAIRMAN:

Prof. PhD Eng. Hab. Silviu NĂSTAC

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  EXPERIMENTAL STUDY OF THE TENSION MECHANICAL PROPERTIES OF PETG AND PLA MATERIALS USED IN 3D PRINTING

- **Bencze A., Stanciu A.**

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  STUDY ON NEW CONCEPT OF AIRCRAFT FRAME - PAX CROSSBEAM CONNECTION

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- **Tudor A., Leopa A.**

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  IDENTIFYING THE POSITION OF BROKEN FIBERS IN REINFORCED COMPOSITES

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BOOK OF ABSTRACTS

COMAT 2024

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ASSESSMENT OF ZIRCONIA THERMAL BARRIER COATINGS ON AUSTENITIC STEEL

Savin A.*[1], Steigmann R.[1], Faktorova D.[2]

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2. *Faculty of Special Technology, Alexander Dubcek University of Trenčín, Trenčín, Slovakia; dagmar.faktorova@tnuni.sk*

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The need to increase the efficiency of aerodynamic engines and last generation turbines (t>1200o C) have imposed new types of materials and coating techniques for the realization of thermal barriers (TBCs). Yttria-doped zirconia (YSZ)-based TBCs are now competing with new materials to provide durability and reliability. The research is focused on the development of new TBC manufacturing techniques to improve the performance of YSZ. A layer of zirconia, without intermediate thermally grown oxide (TGO), with micrometric thickness of the deposition on an austenitic steel support, multilayered and doped with nanometric particles in two phases, was investigated non-destructively. The results obtained on the quality and adhesion to the support obtained by X ray diffraction (XRD) and scanning electron microscopy (SEM) are compared with the electromagnetic ones (EM).

SOUND-ABSORBING MATERIALS FOR ACOUSTIC PANELS (MINERAL WOOL, POLYURETHANE, POLYSTYRENE

Vasile O.*[1], Scorțea J.[2], Zlătoianu S.[3]

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The essential test and design features for sound-absorbing materials' mechanical and acoustic parameters are addressed.

SUSTAINABLE SOUNDPROOFING MATERIALS BASED ON FOAM FORMED CELLULOSE FIBRES

Iana Roman M.[1], Nechita P.*[1], Nastac S.M.*[1,2], Guiman M.V.*[2], Seciureanu M.[1]

1. *Dunarea de Jos University of Galati, Galati, Romania*
2. *Transilvania University of Brasov, Brașov, Romania*

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This paper presents the noise insulation performances evaluation of cellulosic foams with applied treatments for improving functional properties according to the practical soundproofing application requirements. The treatments, based on xylan derivatives, were applied on samples surface. The results were presented and discussed comparatively with the initial samples without any surface treatments and with a selection of commercial materials usually used in actual soundproofing practice.

ABOUT SIMULATION OF VIBRATORY COMPACTION EQUIPMENT WITH COMPOSITE MATERIALS INCORPORATED

Miron D.S.[1], Debeleac C.N.*[2]

1. *Dunarea de Jos University of Galati, Galati, Romania,*
2. *Research Center for Mechanics of Machines and Technological Equipments, Braila, Romania, carmen.debeleac@ugal.ro*

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In this paper, the authors addressed the topic of computational simulation of composite materials from the constructive structure of vibratory compaction equipment (roller, rammer, vibratory plate). The aspects that must be considered for the development of dynamic models that accurately simulate the engineering phenomenon have been identified. In the current context of the digitization of industry 4.0, the estimation based on such models of the efficiency of the compaction process is of great relevance.

ADVANCES OF COMPOSITE MATERIALS IN COMPACTION EQUIPMENTS FABRICATION. A REVIEW

Miron D.S.[1], Debeleac C.N.*[2], Nechita P., Căpățână G.F.,Dobrescu C.F., Calu M.

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**Corresponding author: carmen.debeleac@ugal.ro*

In this paper, the authors address an actual aspect regarding the introduction into manufacturing of parts of compactors made of advanced composite materials. In this sense, types of materials, their technical requirements, examples of component elements whose traditional material has been replaced by composite materials are presented. The benefits of implementing these materials in the current manufacture of compactors have been quantified according to the statements of the major manufacturers of equipments for compaction.

METHOD TO RECYCLE CORRUGATED CARDBOARD IN ECO-FRIENDLY COMPOSITES

Mazaherifar M.H.*[1], Cosereanu C., Timar C.M., Georgescu S.V.

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**Corresponding author: mohammad.mazaherifar@unitbv.ro*

As sustainability becomes increasingly important across industries, innovative methods for recycling materials are essential for reducing waste and minimizing environmental impact. This study investigates a method for recycling cardboard into eco-friendly composite materials, focusing on their physical, mechanical, thermal, and acoustic properties. Two composite formulations, designated as A (unprinted cardboard) and B (printed cardboard), were produced and compared based on their density, dimensional stability, modulus of elasticity (MOE), modulus of rupture (MOR), internal bonding strength, thermal conductivity, and sound absorption. Thermal conductivity tests revealed that composite A had a value of 0.053 W/m·K, slightly lower than composite B, which registered 0.055 W/m·K, suggesting a marginally better thermal insulation capacity for composite A. Furthermore, sound absorption measurements at a frequency of 700 Hz showed similar performance, with values of 0.88 for A and 0.87 for B, indicating that both materials provide effective sound insulation. This study demonstrates the potential of recycled unprinted and printed corrugated cardboard as viable resources for eco-friendly composite production. The results suggest that these composites are appropriate as indoor acoustic panels and thermal insulation application.

VISCOUS–ELASTIC PROPERTIES OF VARNISHED WOOD

Gall R. [1]***, Stanciu M.D.*** [*1]***, Savin A.*** [1,2]

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The varnish together with the wooden support forms a new layered mechanical system that has viscous-elastic properties different from the individual components. The work aims to investigate these properties through mechanical dynamical analysis, studying the influence of the wood species, the main direction, the type of varnish on the storage modulus, loss modulus and damping. The results showed that the wood species, the type of varnish (oil-based varnish and alcohol varnish), the thickness of the varnish film influence the viscous-elastic behavior at different stress frequencies.

HYBRID BIOCOMPOSITES: PROPERTIES AND PERFORMANCE FOR EXOSKELETON APPLICATIONS

Savin A.*[1], Steigmann R. [1]***, Dobrescu S.G.***[1]***, Moraras C.***[2]

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2. *Faculty of Mechanical Engineering, Technical University Gh. Asachi Iasi, Romania, ciprian-ionut.moraras@academic.tuiasi.ro*

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Bio composites are biocompatible composites, having organic or inorganic components in their composition. A 100% ecological bio composite material consists of a matrix (resin) and reinforcement represented by natural fibers. The matrix can be from two resources, i.e. renewable or non-renewable polymers. The matrix has a major importance in protecting the reinforcement against exposure to the environment through mechanical and/or chemical damage and for supporting the loads. The paper analysis the hybrid (basalt/flax) bio composites for determination of mechanical properties on DMA tests, in order to evaluate possibility to use the composite bio basalt/flax made of 8-ply flat woven laminates for realizing exoskeleton for transport and weights handling and to compare the performance for the stacking configurations considered.

EVALUATION OF OPERATING PERFORMANCE AT FLOW AND PRESSURE, WITH NOMINAL VALUES FOR VENTILATION PIPING

Ion D.*[1], Pandele R.[2], Cotoban A.[3]

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**Corresponding author: dan.ion@imsar.ro*

The cooling procedure and performance capability analysis for vent piping at pressure and flow parameters are discussed.

TECHNICAL SOLUTIONS FOR EQUIPPING FLUID PIPELINES UNDER PRESSURE

Cotoban A.*[1], Ion D.[2]

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Equipping with fluid pipelines under pressure is the fundamental technical procedure for establishing the technical solution for nuclear power plants.

EVALUATION OF FATIGUE RESISTANCE OF COUPLERS FOR CONCRETE STEEL BARS FOLLOWING NORMATIVE REQUIREMENTS

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The paper presents the method and results of fatigue tests of steel couplers as coupling elements of steel-concrete bars.

EVALUATION OF THE STIFFNESS AND DAMPING OF ELASTOMERIC ISOLATORS

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The experimental and engineering method of the numerical determination of damping and dynamic stiffness on test stands based on European standards is approached.

STUDY REGARDING THE INFLUENCE OF THE BUILD PLATE TEMPERATURE AND THE FILAMENT COLOR ON THE TENSILE STRENGTH OF FDM PRINTED PLA SPECIMENS

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This study investigates the effect of the build plate temperature on the tensile strength of PLA products manufactured by FDM 3D printing. Tensile tests were conducted on specimens printed at 40°C, 60°C, 80°C, and 100°C using different colored PLA filaments (natural, black, red, and gray) aiming to analyze the combined influence of temperature and pigment. Results show that higher bed temperatures enhance interlayer adhesion, improving mechanical strength, but also increase the risk of deformation. The research provides recommendations for optimizing the printing parameters, contributing to the development of more sustainable and efficient 3D printing techniques for PLA.

THE EVOLUTION OF THE EIGENVALUES FOR A RECTANGULAR PLATE WITH DIFFERENT ASPECT RATIOS

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The paper presents the analytical results obtained for the eigenvalues of a thin rectangular plate simply supported on two opposite sides and clamped on the other two for different ratios of the sides of the plate a/b, from 1/3 to 3. The obtained eigenvalues are necessary for the calculation of the natural frequencies of the plate and for the representation of the modal shapes. Considering the sides are simply supported at x=0 and x=a, the results indicate a strong change in the eigenvalues for ratios a/b<1, respectively a slight change for a/b>1, changes that influence the natural frequencies and the modal shapes of the plate.

ESTABLISHING THE LEVEL OF ADMISSIBLE VIBRATIONS OF ISOLATED FANS EQUIPPING PUBLIC BUILDINGS

Drd. Ing. Dan Ion – IMSAR, Drd. Ing. Andrei Cotoban – IMSAR

The vibration and flow-pressure functional performance assessment method with nominal values for the ventilation piping is approached. The vibration curves transmitted to the building structure are determined.

ANALYSIS OF THE ACOUSTIC SPECTRUM AND VIBRATIONS OF FLUID TRANSPORT PIPELINES IN TURBULENT FLOW EQUIPPING NUCLEAR-ELECTRIC POWER PLANTS FOR SEISMIC ACTIONS

Drd. Ing. Andrei Cotoban – IMSAR, Drd. Ing. Dan Ion – IMSAR,
Drd. Ing. Radu Pandele – UNSTPB

The paper deals with the vibrations of fluid transport pipelines in turbulent flow with limited values to ensure functionality.

DYNAMIC BENCH EVALUATION OF ELASTOMERIC DEVICES FOR BRIDGES

Dr. Ing. Polidor Bratu – IMSAR, Dr. Ing. Ovidiu Vasile – UNSTPB,
Drd. Ing. Sorina Zlătoianu – UNSTPB

The dynamic methods on the test stand according to EN 15129 for elastomeric devices for dynamic seismic isolation of bridges are presented.

TESTING THE PREFABRICATED BEAMS IN SITU

Dr. Ing. Polidor Bratu – IMSAR, Dr. Ing. Ovidiu Vasile – UNSTPB,
Ing. Aurelian Ghinea – ICECON SA, Drd. Ing. Dan Ion – IMSAR,
Drd. Ing. Sorina Zlătoianu – UNSTPB, Drd. Ing. Jazmina Scorțea - UNSTPB

The paper presents the normative method and the stand for the "in situ" test of prefabricated beams with lengths of 15, 20, 30, and 40 m for bridges.

DYNAMIC RESPONSE OF ELASTIC BUILDINGS WITH FLUIDIC DISSIPATORS EMBEDDED IN THE RESISTANCE STRUCTURE

Dr.Ing. Polidor Bratu – IMSAR, Drd. Ing. Andrei Tudor – IMSAR,
Dr. Ing Daniela Dobre – UTB

The paper deals with the concept and dynamic response of elastic buildings with fluidic dissipators embedded in the resistance structure for the reduction of seismic shock energy.

EXPERIMENTAL STUDY OF THE TENSION MECHANICAL PROPERTIES OF PETG AND PLA MATERIALS USED IN 3D PRINTING

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This paper investigates the mechanical behavior of 3D-printed Polyethylene Terephthalate Glycol (PETG) and PLA (Polylactic Acid). The aim of this study is to provide information on how the tension mechanical properties of 3D-printed PETG and 3D-printed PLA are affected by the irregularities in the printing material and from the printing process, using samples with the infill parameter set to 100%. PETG and PLA exhibited elastoplastic behavior during tension tests, characterized by an initial linear elastic region followed by plastic deformation before fracture. Obtained results indicate that samples made with PLA exhibit superior mechanical properties compared to those made with PETG, but also with important variations between samples from the same material.

ANALYSIS OF A 3D PRINTED EYEGLASSES FRAME - EXPERIMENTAL STUDY

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In this paper is presented a comparative study for an eyeglass frame realized from 3D printed materials (PLA and PETG), as well as from existing eyeglasses frames on the market made of plastic materials, which are the most widespread. For these frames, designed and printed from new materials, made with the help of the Prusa type 3D printer, an optimal weight to strength ratio could be obtained by using a corresponding printed material density. Both the frames that are on the market and the printed ones were subjected to mechanical bending tests, thus having a comparative analysis of the mechanical properties. PLA's benefit as a bio-plastic is its versatility and the fact that it naturally degrades when exposed to the environment. PETG is a material with a unique mixture of qualities, it is readily available and relatively cheap, with a high allowable stress, being easily recycled, transformed into the original resin, and also it is very glossy.

STUDY ON NEW CONCEPT OF AIRCRAFT FRAME - PAX CROSSBEAM CONNECTION

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The paper is presenting a study on a new concept of an aircraft frame to passenger floor crossbeam connection. The current standard in the industry consists in a fastened joint (large bolt field) between the aircraft frame's web and the web of the crossbeam profile. This extremely rigid connection also transfers, on top of the axial loads, bending moments between the parts, which leads to high stresses and strains in the area. In order to mitigate these high local loads, the parts require increased stiffness, leading to increased weight. The new proposed concept consists of an articulated connection that transfers only axial loads, while the bending moments are not transferred any more. Analysis (FEM and classical calculation) are carried out for both standard and new concept, on metallic and composite materials components. Results (deformations, stress and strains) are compared in order to determine the new concept behavior.

HEMP-BASED COMPOSITE MATERIALS AS A SUSTAINABLE SOLUTION FOR MODERN INDUSTRIES

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In the global effort to develop sustainable solutions, hemp-based composite materials have emerged as a viable, less toxic and environmentally friendly alternative to traditional materials. Due to its physical and mechanical properties, hemp is a renewable resource with significant potential in industries such as aerospace, construction, transportation, and energy. This article aims to investigate the manufacture and tensile strength of hemp roving, hemp coupled with fiber glass and fiber glass composites. Microscopic observations are also made to evaluate the failure of the test specimens.

CROSS-CORRELATIONS BETWEEN INPUT AND OUTPUT DYNAMICS OF VIOLINS BASED ON SPECTRAL RESPONSE OF ANISOTROPIC MATERIALS

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The aim of this work is the identification and characterization of potential correlation between violin player dynamics - as the input and violin spectral response - as the output, taking into account the anisotropic materials acoustical characteristics. Experimental research was developed on a few violin players, which have performed the same musical score. Motion analysis techniques were applied on short movies, acquired with slow-motion camera. The basic information provided by motion analysis software was processed using computational methods in order to obtain spectral characterization of motion, especially in terms of significant frequencies. The cross-correlative aspects between spectral composition of sounds and players motion respectively was finally evaluated.

STATIC ANALYSIS AND SIMULATION OF THE BEHAVIOR OF ALUMINUM COMPOSITE MATERIALS

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The mechanical behavior of aluminum-based composites (MMC) under static stress is investigated, focusing on Aluminum 2024 and Aluminum 2024-T3 alloys. Through a series of mechanical tests, such as tensile and bending, the strength and stiffness properties of the materials were evaluated, with a significant improvement observed in the case of heat treatment. Numerical simulations using the finite element method (FEM) were also performed to validate the predicted behavior of these materials. The obtained results showed a strong correlation between experimental and simulated data, highlighting the potential of using aluminum-based composite materials in industrial applications, such as aeronautics and the automotive industry.

GLASS FIBER COMPOSITE MATERIALS: STUDIES AND EXPERIMENTAL TESTS

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Glass-based composite materials have become increasingly important due to their exceptional mechanical and chemical properties. This article reviews the current state of research, describes the experimental methodology for testing the mechanical properties of glass fiber reinforced composites, and presents the results of tensile, compressive, and bending tests. The findings highlight the high potential of these materials in various industries, from construction to aviation.

EXPERIMENTAL RESEARCH ON THE MECHANICAL PROPERTIES OF THE CARBON AND KEVLAR BASED COMPOSITES

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Composite materials, increasingly used in high-end fields such as aerospace and automotive, offer major advantages due to their high strength-to-weight ratio. This paper investigates the mechanical properties of carbon fiber and kevlar reinforced composites through flexural testing. Experimental tests were performed using standardized methods, and the results highlighted the differences in performance between the two materials. Carbon fiber composites have higher stiffness, while Kevlar ones are more elastic and impact resistant. The findings highlight the importance of applying these materials in industries where light weight and mechanical performance are critical.

STUDY ON THE MECHANICAL PROPRIETIES OF COMPOSITE PANELS BASED ON FIBER GLASS IMPREGNATED WITH DIFFERENT BINDING AGENTS

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In the mechanical research of composite materials with fiber glass we explore the properties and behavior of these materials under varied conditions from static loads to dynamic ones. The composite materials for the tests are created by combining two or more components with different properties to achieve superior performance to individual components. A crucial aspect of the research is understanding the mechanical behavior of these materials under different loading conditions. Mechanical tests include tensile tests, compression, bending and bending to evaluate the strength and stiffness of the composite. In plus, impact tests can be performed to determine the material's ability to absorb energy during sudden charging. These tests provide essential data for optimization design and engineering of composite materials.

PROCESSING OF A COMPONENT USING A CNC MILLING MACHINE

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CNC (Computer Numerical Control) milling is an advanced technology essential in the manufacturing industry, providing solutions for manufacturing complex parts with a high degree of precision and repeatability. This paper reviews the fundamental processes of CNC milling, starting with CAD design and continuing with CAM programming, machine setup and execution of milling operations. Critical process parameters such as rotational speed, feed and depth of cut that influence product quality and efficiency are discussed. The machined part is made of annealed aluminum alloy Rm ≥ 300 N/mm2. The machine tool used is Emco 840 CNC milling machine

APPLICATIONS OF FRACTIONAL CALCULUS IN DYNAMIC RESPONSE EVALUATION OF ELASTOMERIC MATERIALS

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This study had proposed to evaluate the ability of fractional calculus to provide suitable responses for transitory regimes of vibration isolation elastomers-based systems with continuously variable characteristics. The analyses were performed based on the single degree of freedom model schematics. The results were comparatively discussed both with those of a system with nonlinear viscous and elastic characteristics, and with a selection of experimental investigations, underlining the advantages of fractional calculus schematizations.

ASSESSMENTS ON OPERATIONAL DYNAMIC RESPONSE CHANGES OF TONE WOOD DUE TO AGEING PROCESSES

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The properties changes of tone wood with time present a major influence for musical instruments embedding resonant cavities. Taking into account available techniques for investigation and results processing of transitory responses of this kind of material, the authors have adopted a combined method based on cross-correlation and joint time-frequency analyses, in order to acquire specifically aspects related to the modal response in terms of dominant frequencies and spectral damping. The results were presented and discussed comparatively during the ageing process of tone wood samples.

OPTIMIZATIONS OF A SPATIAL SYSTEM OF BARS AT WHICH ONE ADDS AN EXTRA BAR

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In a previous paper we have studied some conditions for optimizing a spatial system of spherical articulated bars at both ends and having a common end. Optimizations have been studied in the case of adding two bars. In this work, only one bar is added, the optimizations referring to the minimum displacement of the common point of the bars or the minimization of tension in a certain bar.

EVALUATION OF THE DEFORMATION PERFORMANCE OF SANDWICH PANELS WITH POLYURETHANE, MINERAL WOOL, AND POLYSTYRENE

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Based on the normative documents, the experimental evaluation method of the deformability performance of sandwich panels with polyurethane, mineral wool, and polystyrene core is presented.

THE BEHAVIOR OF COMPOSITE ROAD STRUCTURES UNDER DYNAMIC ACTIONS

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Evaluation of the resistance capacity of composite road structures based on asphalt mixtures with polyurethane and polymer fibers to dynamic actions in operation.

THE DYNAMIC RESPONSE OF LAND MASSIFS TO SEISMIC ACTIONS

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The dynamic behavior of earth masses (slopes, embankments, embankments, and working platforms) to dynamic actions originating from earthquakes is treated.

DIMENSIONING OF VISCOUS DISSIPATERS FOR EQUIPPING CONSTRUCTIONS SUBJECT TO SEISMIC ACTION

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The paper presents the sizing method of viscous fluidic devices for equipping constructions under seismic action.

IDENTIFYING THE POSITION OF BROKEN FIBERS IN REINFORCED COMPOSITES

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In this study, we investigated a prismatic cantilever beam with a plastic matrix reinforced by four ductile iron wires. The main goal was to expand the accuracy of the mathematical equations that describe how the frequency changes due to cracks in reinforced composites with broken wires. To do this, we simulated the behavior of an intact beam and beams with broken fibers at various positions and determined the natural frequencies for six transverse vibration modes. We then used our original theoretical formulas to calculate the natural frequencies of the beam and compared the theoretical results with the simulation results. We found that the results aligned, allowing for the application of a damage detection method based on local curvature and frequency changes.

DAMAGE SEVERITY ESTIMATION FOR REINFORCED COMPOSITES USING MODEL PERFORMANCE ANALYSIS METHODS

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In this study, we have investigated a composite cantilever beam with a rectangular cross-section. The beam is made of plastic and has four wire reinforcements constructed of ductile iron. The examination involved numerical analysis based on theoretical formulae, followed by simulation using Solidworks software. A comparison of the frequency ratios obtained from theoretical and Solidworks numerical models revealed a minimal error of 1.389% coupled with a substantial correlation coefficient of approximately 0.9590. Subsequently, two top reinforcements within the beam were deliberately severed to assess the behavior of both the intact and damaged beams. The primary objective is to ascertain the optimal severity of damage utilizing established mathematical methodologies reliant on error deviation indicators or Model Performance Analysis (MPA).

CHANGING THE NORMALIZED NATURAL FREQUENCIES FOR A RECTANGULAR PLATE WITH A DAMAGE

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The paper presents the analytical results obtained for a thin rectangular plate with a damage from the point of view of the dynamic behavior. The damage can occupy any position on the plate surface, and the change in natural frequencies is presented for the normalized values by the ratio between the natural frequency of the damaged plate and the natural frequency of the healthy plate. The paper presents two cases of analysis: the rectangular plate simply supported on all sides and the plate simply supported on two opposite sides and clamped on the other two. Changes in natural frequencies are illustrated as 3D surfaces and provide an overview of the dynamic behavior of the plate when the damage can occupy any position on the plate.

CONCEPTION AND NORMATIVE PERFORMANCE OF SOUND-ABSORBING PANELS FOR ROAD NOISE MADE IN ROMANIA

Dr. Ing. Polidor Bratu – IMSAR, Dr. Ing. Ovidiu Vasile – UNSTPB,
Drd. Ing. Jazmina Scortea – UNSTPB

The basic concepts, the actual performances, and the normative level for the mechanical and acoustic parameters of sound-absorbing panels are established.

THE DYNAMIC RESPONSE AND RESONANCE WITH A FUNCTIONAL, TECHNOLOGICAL ROLE FOR VIBRATING-COMPACTING ROLLERS

Dr. Ing. Polidor Bratu – IMSAR, Dr. Ing. Oana Tonciu – UTCB,
Dr. Ing. Cornelia Dobrescu - UDJ Galați, Dr.Ing. Adrian Leopa – UDJ Galați

The resonant performance level of the vibratory compaction process for road foundation soil layers is discussed.

THE DYNAMIC LIQUEFACTION EFFECT OF SANDY SOILS UNDER SEISMIC ACTIONS

Dr. Ing. Cornelia Dobrescu - UDJ Galați, Dr. Ing. Carmen Debeleac – UDJ Galați
Drd. Ing. Aurora Potârniche –UDJ Galați

The paper addresses the liquefaction process of sandy soil massifs due to earthquakes in Romania.

DYNAMICS OF INSULATION AT THE BASE OF RIGID BUILDINGS WITH ELASTOMERIC INSULATORS

Dr. Ing. Ovidiu Vasile – UNSTPB, Dr.Ing. Daniela Dobre - UTCB,
Dr. Ing. Cornelia Dobrescu – UDJ Galați

The method and the calculation program of the insulation of rigid buildings at the base with elastomeric insulators are addressed.

MAXWELL'S RHEOLOGICAL MODEL FOR BASE ISOLATION OF RIGID BUILDINGS UNDER THE ACTION OF EARTHQUAKES

Dr. Ing. Polidor Bratu –IMSAR, Dr. Ing. Patricia Murzea-ATM,
Dr. Ing. Cornelia Dobrescu – UDJ Galați, Dr. Ing. Daniela Dobre –UTB

The effect of base isolation with the Maxwell model on the seismic action in Romania is presented.

ZENER RHEOLOGICAL MODEL FOR BASE ISOLATION OF RIGID BUILDINGS TO SEISMIC ACTIONS

Dr. Ing. Polidor Bratu – IMSAR, Dr. Ing. Cornelia Dobrescu –UDJ Galați,
Dr. Ing. Nicușor Drăgan - UDJ Galați , Dr. Ing. Patricia Murzea – ATM,
Dr. Ing. Silviu Nastac - UDJ Galați

The paper deals with the effect of the Zener model on the dynamic isolation of rigid buildings with a viscoelastic composite support system at the base.

BIOMECHANICAL RHEOLOGICAL MODELS OF HUMAN-MACHINE INTERACTION IN VIBRATORY MODE

Dr. Ing. Cristina Nițu –IMSAR

The rheological model of the human osteoarticular system under the action of vibrations transmitted by the machine is presented.

THE EFFECT OF VIBRATIONS TRANSMITTED TO MAN AS BIOMECHANICAL SYSTEMS

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The paper deals with the physiological and pathological effects of vibrations transmitted to man. Thus, the human body subjected to dynamic vibratory and undulatory actions must support the minimum permissible level of vibrations both in terms of duration of action and in terms of the size of the spectral amplitudes.

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