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Romanian Journal of Acoustics and Vibration

RJAV

A publication of the Romanian Society of Acoustics

Volume X, Issue 2, 2013

EDITORIAL

ARTICLES

Considerations Regarding the Influence of the Mechanical Vibrations Upon a Dynamic System Used in Tobacco Industry

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Abstract: - The paper analyses, from the point of view of the mechanical vibrations, the apparatus of transporting and drying of tobacco leaves. The technical literature studies a reduced number of types of such apparatuses, which are an important component of the technological process of cigarette production. In the present paper, fundamental knowledge applied to a model of the driving gear and to a model of the transport system, respectively, of such an apparatus, allows it to obtain some graphical representations, useful to determine its vibratory behavior.

Keywords: driving gear, representative point, time-history, phase plane, dynamic system.

Analysis of Dynamic Response of the Human Body as a System With Several Degrees of Freedom From External Harmonic Perturbations

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Abstract: - The modal analysis enables the evaluation of a certain structure`s behaviour based on the identification of the resonances or of the feed-back modes. It can be a method through which the modal parameters of the human structure (frequency, amortization, modal shape) can be identified for our own area of interest.

Keywords: - frequency, damping, modal form

Improvement of Acoustic and Thermal Comfort by Turning Waste into Composite Materials

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Abstract: - This paper presents research on developing new types of composite materials with sound absorbing and thermal insulating properties, in order to improve the acoustic and thermal comfort of an enclosure. Thus, in order to achieve these materials, several wastes were used (fir sawdust, beech sawdust and particles of recycled rubber), as well as polyurethane binder, which was used as a matrix.
The produced materials were characterized both acoustically (sound absorption coefficient) and also in terms of heat transfer (thermal conductivity). Results show that the achieved materials have very good acoustic and thermal properties and that these properties vary according on the nature of the waste used as raw matter in producing these materials.
Sound absorbing and thermal insulating materials can be used to obtain an acoustic and an adequate thermal insulation of enclosed spaces: in residential buildings, commercial buildings, industrial buildings, education/ school buildings, on building sites, on highways, roads and streets, airports, ports, railroads etc.

Keywords: - acoustic comfort, thermal comfort, composite material, waste

Dynamic Analysis of Thin Plates with Defects by Experimental and FEM Methods

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Abstract: - In this paper an analysis regarding the dynamics of thin rectangular plates embedded on all edges is presented; aiming to highlight the effect of defects upon their natural frequencies. The first thirty natural frequencies were obtained for a plate without defect and the same plate with four different types of defect. It was placed in the corner of the plate; one dimension (the length of defect) was increased successively. The results in terms of frequencies and mode shapes are finally presented from all values obtained in tabular form, were prepared graphs to compare the results and highlighting the way how natural frequencies changes due to defect. Finally, the results are compared with measurements, in order to demonstrate the validity of the theoretical considerations.

Keywords: - defect, finite element analysis, plate, natural frequency, vibration mode shapes

Application for Automated Recognition of Damage Locations

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Abstract: - This paper present an application developed in Visual Basic, able to precisely indicate a damage location for known beam characteristics (in terms of geometry and mechanical properties) and the natural frequencies of some weak-axis transversal bending vibration modes. The application bases on the implementation of a cost function (namely the Minkowski distance) in an algorithm contrived by the authors. It is able to recognize the beam model proper to be used, function on its slenderness, and to identify the beam health state at the beginning of the monitoring process. Afterwards, based on comparison of the frequencies periodically acquired, the application signalizes the occurrence of damage and indicates its position along the beam. The reliability of the implemented algorithm is proved by numerous experiments.

Keywords: - vibration, natural frequency, beam, damage localization, software application, Visual Basic

Determination of the Natural Frequencies of Beams Using Sound Pressure

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Abstract: This paper presents a method to determine the natural frequencies of transversal bending vibrations of beams and plates by means of time-history analysis. As excitation source the sound pressure produced by a speaker was used; it permits an accurate control of the exciting frequency. The method consists in exciting the beam/plate around the resonance frequency analytically determined and find the frequency value that produces the highest amplitudes of the stabilized system, without inducing the beat phenomena. By departing from that frequency in sense of increasing or decreasing, the amplitude is diminished and signal envelope becomes modulated in amplitude. It can be used in application where contact between the system and the exciter is not possible or permitted.

Keywords: - beam, vibration, natural frequency, excitation, sound pressure

The Study of the Vibrations and Noises of a Stand with Planetary Mechanism used in the Power Sources Coupling

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Abstract: - In this paper we present in the first stage the components of an experimental stand that couples a source of thermal energy and two sources of electric energy. The experimental determinations have as main goal the determination of the noise and vibrations level for the mechanical system that couples the three sources of power. In the final part of the paper we present the conclusions resulted after the analysis of the spectrograms of frequency regardind the global level of vibrations and noise.

Keywords: - planetary mechanism, spectrograms in frequency, noise level

On the Vibrations of a Mass Linked by Two Nonlinear Springs with Quadratic and Third Order Polynomial Characteristics

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Abstract: - We study the equilibrium positions and their stability in the case of a mass linked by two nonlinear springs. These springs have polynomial characteristic of different orders; one of them is a quadratic one and the second is described by a third order polynomial. The complications that appear are as mainly caused by the degree of the equation which has to be solved and the fact that the second degree polynomial which describes the characteristic of the first spring is not an odd function. A numerical example concludes this paper.

Keywords: - nonlinear springs, mathematical model, equilibrium, stability

Experimental Investigation of the Reverberation Time Inside a Complex Geometry Indoor Space

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Abstract: - The paper outlines the interest towards reverberation time which is an acoustic parameter that can influence how a speech is perceived in different parts of a room. If for a rectangular shaped rooms Sabine's formulas are applicable, for rooms with a complex geometry its applicability is questionable. The purpose of this research is to analyze the acoustic parameter for a room with a complex configuration and to determine the applicability of Sabine's simplified formula. For measuring the reverberation time multiple points were analyzed using a class 1 precision professional sound meter. For a better understanding of the influence of the reverberation time 2D maps were created. Several comparisons were carried out between the measured reverberation time in this complex geometry room and the reverberation time optimum value, the theoretically calculated value of the reverberation time and the measured values in other rooms from the same building with rectangular shape.

Keywords: - reverberation time, indoor complex geometry, experimental measurements, reverberation time mapping

An Assessment Model of Urban Noise Performed Through SIMITR Subsystem

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Abstract: - Modelling the sound pressure levels of traffic noise at any location in an urban area requires a series of steps in order to collect, collat and report data, in accordance with the European Community legislation (Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002). The present paper presents a model performed through SIMITR (Integrated System for Intelligent Management of Urban Traffic) subsystem, including data collection equipment (Sound Metter Level UC2010-2, Weather Station Tehno Line WS 550), software to process them (Delta Log 5, Noise Studio) and harmonised indicators (Lden and Lnight – A-weighted long-term average sound level as defined in Romanian Standard SR ISO 1996-2) in order to validate the results.

Keywords: - environment, noise, traffic

Controlled Vibrations with Boundary Conditions for Periodically Thin Structure

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Abstract: - This paper studies the homogenization of controlled waves problem over a three-dimensional cross linked structure reinforced that depends on two small parameters ε - the period and δ - the small thickness of the material. Neumann condition heterogeneity lead by passing to the limit as ε and δ, to a limit problem of controlled waves with a foreign term.

Keywords: - reinforced structure, homogenization, controlled waves, variational method of Tartar

Criteria of Stability for Equilibriums Described by Polynomial Characteristic Equations

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Abstract: - In this paper are given some new criteria of stability for the equilibrium positions obtained by solving third, fourth and fifth degrees polynomials. These equations appear when the equation of motion has the form $\ddot{\mathbf{x}} = \mathbf{f}(\mathbf{x})$, in which $\mathbf{x} \in \mathsf{D} \in \mathbb{R}^n$, while $\mathbf{f}$ is a vector function, $\mathbf{f} : \mathsf{D} \to \mathbb{R}^n$. In this paper, the criteria are obtained using the Sturm sequence and they are completely developed for the polynomials of third, fourth and fifth degrees. For the common use, there are also plotted the diagram of the simply stability and sections through it with different planes for the case of the third degree polynomial, or simply sections through the diagrams of the simply stability using different hyper-planes or combinations of hyper-planes for the cases of the fourth or the fifth degrees polynomials. The domains of the simply stability are very complicated and their frontiers are impossible to describe in an analytical way. Practically, both analytical conditions and diagrams of simply stability may be used to determine if an equilibrium position is or is not simply stable. Numerical examples are also presented.

Keywords: - non-linear vibration, stability, polynomial equation

Dynamic Behaviour Analysis of Machines in Transient Regime on Torsional Vibration Stresses

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Abstract: - The paper presents a study of dynamic real machine consists of an engine and body work, using a dynamic equivalent scheme to a system of two discs linked to each other by an elastic element. Is performed an analysis of the transient regime applying a constant torque on the disc of the motor influence also a constant braking torque on the motor drive and if the braking torque is applied to the body of work. It is shows the plan phase variation according to the relative motion law of the dynamic stiffness coefficient based on the ratio mechanical moment of inertia of the motor drive and the working body. Applying Lagrange's equations of second kind is analytically determined and represents their pulsations eigenvalues variation, the maximum angular deformation variation and maximum torque to the transitional regime under the action of constant torque and constant torque braking system. It is graphically shows the influence of the ratio mechanical moments of inertia according to chosen dynamic parameters.

Keywords: - law of relative motion, the phase plane, deformation angular torque