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EDITORIAL

ARTICLES

The vibrations of the elastic suspended rigid with harmonic seismic excitation

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Abstract: - The rigid solid elastically suspended model is common to many technical accomplishments such as: buildings foundations placed on an elastic environment, thermal engines with plastic mounts, grabbing devices (of industrial robots) suspended on the compliance system etc. The elastic elements of these systems are tied to the base (mount, chassis). There is considered that the base has a vibratory movement of a rigid, movement that is constituted in seismic excitation and there are studied the vibrations that are produced in the elastically suspended solid system.

Keywords: - vibration, model, elastic supports, seismic

The analysis of vibration modes for a ventilated break disc

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Abstract: - This paper presents an analysis of vibrations modes regarding a ventilated brake disc that is used on the front axel of a car. All started with the CAD model of the part and the finite elements method was used as a calculation method. For generating the CAD model and for the analysis was used the application CATIA v5. The results of the calculation were obtained in the Structural Analysis Laboratory and then were compared with those experimentally determined.

Keywords: - modal analysis, break disc, FEM.

About the Analysis of Post-Impact Oscillator Phenomena Which are Produced in Protective Structures Subjected to Shock Loadings, Using Mechanical Event Simulation

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Abstract: - The article presents some aspects of the analysis oscillatory phenomena occurring after applying a shock loading to a protective structure using response simulation of the structure after impact. Protective structures considered are the ROPS/FOPS structures and mechanical shock is simulated in accordance with the recommendations of reference documentation.
In the first part of the article are summarized the main definitions and notations used in connection with structures ROPS/FOPS and the benefits of numerical simulation of the behavior of mechanical systems. Next, are presented the main aspects of modeling that have a decisive influence on the accuracy of the results which are obtained from post-impact analysis: choosing the right type of finite elements, choosing of the correct material models, setting control scheme and convergence criteria valid, during the behavior simulation of the target structure. All these elements are applied in a case study and final part of the article is dedicated to present some recommendations and conclusions.

Keywords: - Oscillator Phenomena, Protective structure, MES

Study of Vertical Non-linear Systems with Polynomial Characteristics

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Abstract: - In our paper we considered a vertical system of rigid bodies linked one to another and to the ground by non-linear springs. We obtained the differential equations of motion using the Lagrange second order equations and, based on them, we discussed the system of equations used to obtain the equilibrium positions. Considering two of the most used cases, name them the cubic non-linear springs, and the neo-Hookean non-linear springs, we deduced the conditions for the uniqueness of the equilibrium position. We also presented the type of the equilibrium and we studied the small oscillations around the stable equilibrium position. In our paper we studied the stability of the motion, too. The linear case is obtained as a particular case of those considered previous in this paper. Finally, we considered a numerical example, which describes the vertical vibrations of an automobile.

Keywords: - non-linear, polynomial, neo-Hookean, stability, vibrations

Practical Considerations of the Matrix Method Formalism

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Abstract: - The work uses the assumption that the solution to problems of elastic wave propagation in multilayered media, in which each layer is homogeneous and where the ensemble of layers has physical properties that vary only with one coordinate, can be obtained by solving a product of matrices. Considering the 1-D case, a system of two media can be described by an equivalent transfer matrix, which allows for a binary system to find the phase velocity of the elastic waves, using as gauge material one of the two media.

Keywords: - transfer matrix; standing waves; sound velocity; elastic constants

Random vibrations of Duffing oscillator with nonlinear elastic characteristic of exponential type

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Abstract: - We present a method for estimating the power spectral density of the stationary response of Duffing oscillator with nonlinear elastic force of exponential type. The method is based on the idea that a nonlinear system may be replaced by a linear system by minimizing the mean square error of the two systems. An equivalent linear system is derived, from which the power spectral density is deduced.

Keywords: - Non-linear system, random excitation, linearization method, white noise.

Velocity reconstruction in weakly laterally inhomogeneous medium

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Abstract: The case of a wave propagation generated by a boundary source into a weakly laterally inhomogeneous medium occupying a half-space is one of the important actually seismic problems. In this paper I study the problem of the reconstruction of the velocity from the measurements of the wave field on the ground surface, $z = 0$.

Key-Words: inverse problem, seismology, spectral analysis, Fourier transform, wave equations.

Vibrations induced by friction forces in dynamic systems

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Abstract: - Vibrations induced by friction generated a series of major problems in functioning of mechanisms of industrial equipment. Dynamic systems, with parts in motion, function with friction due to direct contact between surfaces of its various components. The present paper shows a synthesis of negative effects caused by different types of friction that can be identified analyzing the vibration signal, thus avoiding the appearance of faults and shortcomings that can compromise the ongoing of an industrial process.

Keywords: - Non-Smooth Dynamics, Unilateral Contacts, Coulomb Friction, Dry Friction.

Vibration experimental determination of internal combustion engines, using its data acquisition and virtual instruments

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Abstract - This paper presents a method for measuring the vibration occurring at internal combustion engines cars, depending on octane of used fuel. Heat engines have been tested on the booth using sensors and transducers connected to specialized data acquisition systems. Data acquisition is done quickly through virtual instruments created. The method is a fast one, used to identify thermal vibrations arising from internal combustion engines which use gasoline as fuel. Will be use petrol with different octane, and gasoline additive, and change the system after injection of 1200 cm^3 Twingo engine will go to measure the vibrations that occur when using methanol as alternative fuel.

Keywords: - heat engine, vibration sensors, data acquisition system, virtual instrument

The influences of undissolved air into the hydraulic agent on dynamics of hydraulic system with rotational drive unit

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Abstract: It is well known from the exploitation activities of hydraulic driving systems that the undissolved air into the hydraulic agent of technological equipments actuating system generates the negative effects regarding the system behavior. These negative effects are due to the cavitations phenomenon, the intensive acoustical phenomenon, as a fact of dynamic characteristics changing of actuating system (natural pulsation, damping parameter, disturbing factors, the frequency of pressure oscillations, etc). This paper presents the qualitative and quantitative analysis of undissolved air percentage influence on hydraulic system dynamic behavior. There are deduced and presented the mathematical model of these influences. This analysis provides a strong argument to avoid of dynamic phenomenon due to the air absorption in hydraulic systems. Hereby this study is very useful both for designers, and for researchers on the technological equipments with hydraulic actuating area.

Keywords: - hydraulic driving, hydraulic agent, natural pulsation, oscillations

Finite Element Method based Algorithm for Localization of Damages in Cantilever Beams

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Abstract: - This paper presents the researches made by the authors in order to develop an algorithm and method to localize damages in beams using vibration measurement. The chosen type of beam was the cantilever one, for which a database containing the first ten natural frequencies in undamaged state was realized. Afterwards, eight points relevant for the characterization of the beam's dynamic behavior were determined by analytical calculus. The database was completed with the first ten natural frequencies of the beam damaged in this points; the resulted shift in frequency for each place of the damage was used to create a pattern, in order to describe the behavior of the damaged beam. The natural frequencies were determined using the Finite Element Method (FEM), the result compared and confirmed by analytical calculus and experimental measurements. Finally, an algorithm based on pattern recognition was developed to recognize, for given vibration measurements, the location of the damage.

Keywords: - cantilever beam, damage, localization, vibration, frequency