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The Motion of a Rigid Body with a Point Constrained to Move on a Fixed Given Surface Using a Multibody Approach

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Abstract: - In this paper we discuss the problem of a rigid body having a point constrained to move without friction on a fixed given surface. Firstly, using Bryan's angles, we deduce the kinematic relations between different parameters of motion and then obtained the matrix differential equation of motion in a multibody approach. A numerical application is also presented.

Keywords: - rigid body, equations of motion, numerical application

Modal Analysis of the Viaducts Supported on the Elastomeric Insulators within the Bechtel Constructive Solution for the Transilvania Highway

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Abstract: - The article presents an approach of six degrees dynamic model of a rigid-solid with some types of symmetries. These symmetries lead to simplified mathematical models, which are easier to solve. If the rigid-solid is jointed of the structure by four elastic bonds, the mathematical model becomes still simple and the vibrations are decoupled into four subsystems of movements: side slipping and rolling, forward motion and pitching, galloping motion, gyration. There is also a case study: the modal analysis of a bridge with the total length of 200 meters, 13.2 meters width and 2.5 meters height, modeled as a rigid solid supported elastically for the Transilvania highway.

Keywords: - bearings, proper modes, decoupled vibrations

Assessment of Dissipated Energy to Harmonic Cycles of Displacement for Visco-Elastic Elastomeric Anti-Seismic Insulators

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Abstract: - The paper presents some results of the research carried out to highlight the dissipation capacity of the elastomeric systems to harmonic deformations due to the kinematic excitations of the exterior harmonic displacements type. Thus, the test procedure is regulated by the provisions from SR EN 1337/3 and SR EN 15129 related to the bearings, respectively anti-seismic devices LDRB, HDRB.

The laboratory test bench is characterized by the fact that the harmonic cycles tests are carried out, in parallel, for a group of two elastomeric devices stressed to shearing.

Since the dynamic and physical model is without added mass, the linear equation rules the entire dissipation and deformation process, expressed both by adequate physical quantities and representative diagrams.

Depending on the discrete variation of the excitation frequency, the modification of the surface and slope of the loops in ellipse form is tracked, i.e. the hysteretic behaviour which does not depend on the excitation frequency, achieving one limit loop.

Keywords: - dissipation, elastomeric system, kinematic excitation

Seismic Isolators - Double Sliding Bearings

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Abstract: - The seismic protection of buildings by seismic isolation is continuously improving since many years. Many new materials and different shapes are contributing to the development of recent high performance devices. As seismic isolators installed between a structure and its foundation to protect it from damage due to earthquake shaking, double sliding bearings use the characteristics of a pendulum to lengthen the natural period of the isolated structure so as to avoid the strongest earthquake forces. They can protect structures and their contents during strong magnitude earthquakes, and architectural innovations are encouraged by the enhanced structural response achieved through seismic isolation.

Keywords: - seismic isolation, double sliding bearing

Assessing the Sound Absorption of Micro-Perforated Panels by Using the Transfer Function and the Impedance Tube

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Abstract: - Micro-perforated panels (MPP) are made and used for decades, a number of researchers proposing to use MPPs for enclosures, featuring the benefits of using them outside as sound barriers, studying the effect of vibration of these panels, which can reduce the sound absorption. Experimental method of transfer function for a series of measurements using the impedance tube was made in order to determine the sound absorption coefficient (α). The resulted values of α for two proposed sets of MPPs, were analyzed and compared, also observing the importance of the air cavity behind the MPP. Some conclusions are observed and compared to the Helmholtz resonator properties.

Keywords: sound absorption, micro-perforated panel, impedance tube, transfer function

Natural Frequencies of Damaged Beams - A New Approach

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Abstract: - This paper introduces a relation which describes the influence of discontinuities on the dynamic response of prismatic cantilever beams. The relation, providing the natural frequencies of weak-axis bending vibration modes of damaged beams, was contrived by considering the continuous model in a global approach, opposite to researches presented in literature involving mainly models based on two segments linked by a rotational spring and focusing on the local effect of the discontinuity. To demonstrate the validity of the proposed relation, a cantilever beam was analyzed both in undamaged and damaged case, being highlighted the natural frequency changes due discontinuity for various damage scenarios; finally curves representing frequency changes were plotted. Comparing the results obtained by the two approaches, a similarity for the frequency changes of the first bending vibration modes is obvious, while for higher modes the "classical" approach is not able to provide any result due to limitations of the numerical methods. Opposite, the proposed relation is simple to be utilized and offer precise results for all bending vibration modes, fact proved by examples presented at the end of the paper.

Keywords: - vibration, natural frequency, cantilever beam, discontinuity

Determination of Damping Coefficient for Lateral Displacement in Case of Two Console Rotors in Air and Water

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Abstract: - The paper is dedicated to some original experimental researches aiming to determine the damping coefficient for lateral displacement c in case of two rotors in console. We have described the experimental installation, the measuring chain and its components. The results of measuring in air and water are also covered in the paper.

Keywords: - rotordynamics, lateral displacement, damping coefficient

The Schroeder Frequency of Furnished and Unfurnished Spaces

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Abstract: - This paper considers the situation in which an empty room is furnished. Hence, the Schroeder frequency of an empty room is compared with the Schroeder frequency of the same room when it is furnished. It is concluded that the Schroeder frequency of empty spaces is more accurate compared with the Schroeder frequency of furnished spaces.

Keywords: - Schroeder frequency, furnished and unfurnished spaces.

A Car Component Subjected to Multiple Sources of Random Vibrations

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Abstract: - In this article, the random vibration simulation method applied to a car component is presented. The main vibration sources which appear at the automotive body level are mentioned. By using finite element analysis, one can estimate the response of the structure in terms of the probability of the maximum displacement and stress. A laboratory test with good results for the partial validation of the simulation has been performed. By using the random vibration simulation method, it is possible to estimate the behavior of a structure excited by random vibrations, with a good precision for various applications.

Keywords: - Random vibration, finite element analysis, automotive, modal analysis, power spectrum, power spectral density.

Investigation Composite Materials for its Sound Absorption Properties

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Abstract: - This paper presents research on determining the sound absorption coefficient depending on frequency, for each sample, thus determining the sound absorption capacity of each obtained material. Materials were made from particles of recycled rubber, pine sawdust and a polyurethane binder. The use of recycled rubber and sawdust in the production of sound absorber will help combat the existing problems of both waste disposal and noise pollution. Absorption coefficient is calculated using Delany-Bazley model and experiments are conducted in impedance tube to validate the analytical outcomes.

Keywords: - sound absorption coefficient, acoustical materials, impedance tube, Delany-Bazley model.

Evaluation of the Antivibrating Damping Capacity in Case of Elastomers Used for Tram Railway Supporting

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Abstract: - This paper is focused on the effect of elastomer supporting of the tram railways used for damping vibrations and noise transmitted to the surrounding buildings. For this, the experimental methods under dynamic regime both stationary and transient attaining the resonance point are presented. In this way the dynamic system parameters, namely: dynamic stiffness, the fraction of critical damping, coefficient of dissipation (hysteresis) were determined. Thus, the damped free vibration method was used and the controlled dynamic method with monotone increasing variation for the excitation frequency for stiffness and damping characteristics of rubber manufactured by various recipes. Finally, the paper presents experimental results obtained in the laboratory and the degree of noise reduction produce by tram railway in large urban areas of cities in Romania.

Keywords: - vibration, damping, rigidity, antivibrating insulation, elastomer.

Internal Soundproofing Buildings Isolated by Elastomeric Links from Externally Induced Vibration

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Abstract: - Interior soundproofing is a requirement for buildings with special activities where the level of vibration and noise shall be minimal. This paper specifies the essential requirements for the definition of performance vibration isolation from the outside of buildings for special purposes. This category includes operating rooms, facilities and premises of "white rooms", rooms processing, calibration and mounting the semiconductor where the level of vibrations from the urban environment and/or industry should be below the allowed threshold. In this context, we detail the dynamic model of a building placed on elastomeric elements for which are set the physical and geometric conditions by decoupling and reduction their frequency in ratio $1/4$ $1/6$ of the excitation frequencies. Also, are set the equations of motion for the externally excited system in order to evaluate the level of forced vibrations.

Keywords: - elastomeric links, vibration, special purpose buildings.