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Analytical and experimental assessment of degrading structures dynamic behavior

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stiffness and damping coefficients of a SDOF oscillating system with degrading hysteretic behavior. The method is based on forced and free vibration laboratory experiments conducted on a cantilever drywall beam with a concentrated mass placed on its free end. The experimental results show an important amplification of the output vibration level due to the stiffness degradation when the driving frequency is slightly lower than the first vibration mode frequency of non-degraded structure. The relatively short time interval for system entering the resonance frequency due to its stiffness degradation outlines a drawback of structural design allowing the occurrence of plastic hinges as seismic building self-protection, particularly in the case of seismic motions with low frequency dominant spectral components (“slow earthquakes”).

Keywords: - structural degradation, vibration tests, model identification

Torsional elastic waves in tubes. Improved dispersion curves

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Abstract: - In the last decades, there is an increasing interest in locating defects in pipeline from the chemical and nuclear industries using ultrasonic torsional waves.

In this paper, the authors are presenting a theoretical study and numerical calculation using Matlab for the dispersion equation of torsional waves in pipes. Even though implementation of the dispersion equation in a computer program was not a simple problem, the authors have succeeded in obtaining very good results compared to those from existing references. Major improvements compared to a recent communication of the same authors, led to accurate dispersion curves for order zero torsional modes.

Keywords: - Torsional waves, guided waves in tubes

Consideration regarding the nonlinear vibration of a mechanical system

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Abstract: - The paper studies, from the point of view of the dynamical systems theory, the nonlinear vibrations of a single-degree-of-freedom mechanical system. The differential equation of motion is analyzed using the method of variation of a significant parameter (time-history), as well as the phase plane method. The behavior of the system is highlighted for certain initial conditions and for certain values of the coefficients of the equation of motion.

Keywords: - nonlinear vibration, oscillation

Application of Superposition Principle to Detect Damages in Beams by using Natural Frequencies

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Abstract: - This paper presents the researches made by the authors in order to detect damages in beams using natural frequencies by applying the superposition principle. The chosen type of beam was the cantilever one, for which a database containing the first ten natural frequencies in undamaged state was realized. The database was completed with the first ten natural frequencies of the beam with one damage in 200 points and 3 levels of severity. The resulted frequency shift 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). Finally, two damages on the beam were modeled and analyzed and the superposition principle was applied and compared with the analyzed cases for the beam with one damage.

Keywords: - superposition principle, finite element method, damage, vibration, frequency

Friction Pendulum Dampers for Earthquake Isolated Structural Systems

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Abstract: - Base isolation systems have become a significant element of a structural system to enhance reliability during an earthquake. One type of base isolation system is Friction Pendulum Dampers in which the superstructure is isolated from the foundation using specially designed concave surfaces and bearings to allow sway under its own natural period during the seismic events. Friction Pendulum Dampers are seismic isolation bearings that have been used as a means of bridge, and building retrofit in numerous cases around the world. To assess their impact on structure performance, models are needed to capture the behavior of these highly nonlinear elements.

Keywords: - Seismic isolation; Base isolation; Friction pendulum system.

The influence of the damping coefficients to the hunting motion stability of the bogies

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Abstract: - Conventional railway vehicle systems exhibit lateral instability phenomenon due to self-induced oscillations of the rigid axle wheelsets, which increases component wear and imposes operating speed limits. To improve the stability performances, without increasing the rail-wheel interaction forces above safety limits, elastic joints and dissipative devices are used to connect the wheelset to the bogie frame. Using the linear elastic and damping model, this paper derives the governing differential equations of motion for a bogie with independently rotating wheelsets. The bogie is modeled by a 6 degree-of-freedom (DOF) system which considers the lateral displacement and yaw angle of each wheelset and the lateral displacement and yaw angle of the truck frame. The equations of motion of the mechanical model, were proceeding in a Matlab-Simulink program. In this paper is presented the influence of the damping coefficients of the model on the hunting motion stability of the considered bogie by numerical simulations.

Keywords: - Hunting motion, critical speed, bogie, damping coefficients

Investigation of the Noise at the Limit of Functional Zones

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Abstract: - Within the context of sustainable development and environmental protection, a special concern is addressed to the study of noise generation and propagation in the environment. An important

contribution to the noise generated in the urban environment has the noise produced by different functional zones. In this paper we present an investigation of the noise at the limit of some functional zones from Timișoara City. We investigate sources and characteristics of the generated noise, propagation way, noxious effects and admissible limits. In order to characterize this noise, measurements were performed in points located near the most important functional zones. Bruel & Kjaer Sound Level Meters were used, which allowed identifying and recording the most important characteristics of the noise. Results of the measurement were processed, analyzed, interpreted and compared with admissible values defined by standards.

Keywords: - Noise investigation, functional zones

Transfer Matrix Method Applied in the Study of Vibrations of the Centrifuges with the Basket in the Console

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Abstract: - This paper approaches a field of advanced research: the study of vibrations of industrial centrifuges by applying the transfer matrix method. It will be established a study model considering the shaft as continuous medium. The transfer matrix and the transition matrices will be established. The case of the free vibrations will be developed. The results will be compared with them obtained using the study model for centrifuges, as discrete system with two degrees of freedom. The paper proposes new approaches in the subject field.

Keywords: centrifuge, transfer matrix method, vibrations, natural frequencies

Evaluation of the Dissipated Energy in Viscoelastic or Hysteretic Seismic Isolators

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Abstract: This paper represents the result of experimental and theoretical researches concerning the behaviour and the performance level specific to neoprene bearings subjected to conformity assessment.

The standardized test involves only quasi-static and/or oligocyclic loading for displacements imposed from outside. This method does not accurately represent the dissipation function of the neoprene bearing under dynamic loading by inertial actions at shock and vibration generated by the road traffic, with variable parameters under aleatory regime.

This paper puts into evidence the energy dissipated by the neoprene under dynamic actions by forces having constant amplitude $F_0 = const$ and $F_0 = m_0 r \omega^2$.

Keywords: dissipater, energy, neoprene, elastic support, hysteretic damping

Study of noise directivity at household air conditioning installations

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Abstract: - This paper presents the experimental determination in various operating modes of noise directivity at household air conditioning installations. To conduct the experimental study a measurement stand was built inside the anechoic chamber where the equipment under study was fitted. To separate the main sources of noise a partition wall was built between inner and outer split unit having also a role in the transmissibility analysis.

Keywords: - household air conditioning installations, noise directivity, anechoic chamber

Noise Mapping in Hungary and Romania

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Abstract: - The First round of the noise mapping obligation according to the European Noise Directive (END) has been finished recently. By the end of 2007 all member states should have prepared their noise maps according to the directive and should have send the noise mapping reports of the European Commission. In 2008 the EU Member states will continue the implementation of the END by preparing the action plans in order to reduce the number of affected inhabitants.

This paper focuses on the action planning work according to END. The authors present here the comparison of two action plans for mid size cities in Eastern Europe. The two compared cities are Szeged in Hungary and Timisoara in Romania. The two cities are geographically very close cities (80 km) with even having a similar urban built up, one would assume the preparation of similar action plans. In opposite to this the authors found more at first sight minor differences than similarities which turned out in the end to have big influence on the action planning procedures.

The authors have carried out strategic action plan for both of the cities in the near past. This paper compares the action planning procedure between the cities. The action plan, and the comparison consist beside the noise reduction possibilities of the cities from a lot of non-noise related issues.

The paper presents the comparison and highlights the future urban development plans of the cities to be considered, the financial possibilities and the participation of the public in action planning

Keywords: - rotordynamics, lateral displacement, damping coefficient