

C H R O N I C L E

35th Winter School on Vibroacoustical Hazards Suppressions
Wisła, Poland, February 26 – March 02, 2007

Dear Ladies and Gentlemens!

Traditionally I invite you to acquaint with abstracts of selected lectures submitted to presentation in jubilee 35th Winter School on Vibroacoustical Hazards Suppressions. This national School, organized by Upper Silesian Division of the Polish Acoustical Society and Institute of Physics at Silesian University of Technology, is planned at February/March 2007 in Wisła.

The conference is the forum for all environmental vibroacoustics fields. Particularly it concern to traffic noise, industry noise, vibroacoustics of machines, room acoustics, noise protection and similar problems. During the School the theoretical works, experimental, measuring, technical, applied and normative ones are presented.

The School lectures, and other conference materials, will be published in the “Materials of the XXXV Winter School on Vibroacoustical Hazards Suppressions” (in Polish) edited by Dr. Mieczysław Roczniak (chairman of the conference). This publication is intend to participants of the School and for many libraries in Poland.

Other information about XXXV WS on VHS you can find at address
<http://ogpta.pols.pl>.

In behalf of Organizers
Roman Bukowski
coordinator of the School

Abstracts

1. An example of mutual correlation of information – relations in secondary tables in acoustical data gathering, updating and distribution systems

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The article presents the project of the relationships between different sets of information gathered in the database system. The relationships were created with use of the surveys from future users and on information from the legal regulations [3–7] which helped to define the expected outcome. The subject covered in the paper is a next stage of development of the acoustical data gathering, updating and distribution systems [1]. During the development relational database were used as well as available operator of relational algebra, which allows to create, search and modify data and allow to put some demands on data integrity.

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2. Analysis of traffic noise probability distribution

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The paper describes the analysis problem of twenty four hours traffic noise probability distribution. There was made the statistical analysis of normality distribution on the basis of Jarque-Bera test, referring to results of traffic noise monitoring, registered in 2004–2005 on Krasieńskiego Avenue in Kraków. The analysis has been led in relation to three stages of traffic noise variability: I-st stage – twenty four hours analysis, II-nd stage – twenty four hours division on two periods: 6:00–22:00 and 22:00–6:00, III-rd stage – twenty four hours division on three periods: 6:00–18:00, 18:00–22:00 and 22:00–6:00.

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3. High energy impulse sound at distant locations. Case study

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The paper deals with some measurement results of impulse noise generated by high energetic blasts, caused by plattering activity. The measurements have been taken at distant locations from the source (a few km), that is why main attention has been paid on the weather conditions on the way of noise traveling. The work was supported by procedures included in the ISO/TS 13474 standard focused on assessing impulse sound propagation for environmental noise assessment. Main hazard for environment caused by such explosions is short high energetic shock wave - acoustic, air blast and paraseismic. The results show

large fluctuations of the noise level even though the pattern process (noise source) was the same and the wind, which has the major influence on sound traveling, was changing very little during the performance. It means that during impulse noise measurement at large distance it is necessary to control environmental parameters in many points on the way of sound traveling, mainly because that impulse sound events characterize ultra high pressure and low frequency nature.

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4. The principles of creating the noise environment protecting program for the areas connected with functioning of the border crossing points

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In spite of Polish observing the Schengen Convention connected with the freedom of internal moving in E.U., the problem of operating the external frontiers is still valid. As long as the political situation in Europe is not change, Poland will stay as the border's state of E.U. and people will be put at risk of the border crossing action.

The noise connected with border crossing functioning is emitted at whole border crossing – at all developed area and routes lead to it. It is not only the border crossing point itself but also all grounds which come under it.

The conducted researches have shown that noise connected with border crossing functioning could be troublesome for the inhabitants of border areas. The problems of exceeding the maximum permissible level of noise on protected areas are mainly connected with many sources of noise producing, for instance lorry type vehicles. On the basis of filled questionnaires it has been found that noise is an important problem for the border areas inhabitants.

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5. Insertion loss of spiral acoustic duct – computational modeling

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The sound attenuation in straight ducts of uniform cross-section is usually given in attenuation per unit length, decibels per meter, decibels per feet. This is a considerable simplification because the attenuation is a function of the character of the sound field entering the duct and the character of sound field is changing along a duct. Sound attenuates when the sound wave interacts with the walls of the duct and this is determined by the impedance of the duct walls. At high frequencies, energy loss due to sound transmission through the duct walls yields only very little sound attenuation, what can be changed in simple way by sound-absorptive lining of the walls.

This paper shows few aspects of computational modeling of spiral ducts as an alternative way to improve high frequency sound attenuation in ducted systems. Main idea is to increase sound wave interactions with a duct walls to get high sound attenuation and low flow damping. It was proved by simulation that spiral duct gives sound attenuation, however there are many acoustical problems that are difficult to verify at first approach.

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6. Reduction of the road traffic noise by management of the vehicle speed

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The vehicle noise emission is a function of the vehicle speed and acceleration (deceleration). The speed can be reduced by the road humps and roundabouts. In both cases deceleration and acceleration are separated by the cruise road segment with the constant speed. The question is the adequate length of the this segment X , i.e. the length of the road hump or radius of the round about. To calculate X , the total noise energy is calculated under the assumption, that the A -weighted vehicle power for deceleration, constant speed, and acceleration are known.

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7. Estimation of sound absorption coefficients of porous materials

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In the paper the theoretical and empirical relationships between sound absorption coefficients and structural parameters of material are discussed.

A procedure for calculating the sound absorption coefficients from knowledge of flow resistance of the material and the thickness of the layer according to International Standard EN 12354-6:2003 (PN EN 12354-6:2005) is described.

The characteristics of sound absorption coefficients for several porous materials obtained from measurements in reverberation room according EN ISO 354 are compared with calculated values, obtained from flow resistance and the thickness of the material.

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8. Characteristics of sound source using for acoustics measurements inside the room

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The noise excitation in the room is required both by sound insulation and reverberation time measurements. According to PN-EN 140-4: 2000 Annex A standard, the omnidirectional radiation in the room can be reached by using sound source in hemispherical polyhedron shape (placed directly on the floor). Such hemi-omnidirectional loudspeaker column is offered by Norsonic company (NOR-250 type). However it was decided to build a new hemi-omnidirectional sound source with major power and efficiency, better frequency characteristic and reduced costs. There were made two loudspeaker columns, with different shape, largeness and material thickness. There were made measurements of directional characteristic and sound power level. The results of measurements show that change of form and largeness of loudspeaker column has an influence on directional characteristic shape and sound pressure level.

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9. X3-NOISE – Aircraft External Noise Research Network and Coordination

Description of Work

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The X3-NOISE is the Coordination Action in the framework of 6FP (priority: Aeronautics) – Integrating and Strengthening the European Research Area. It is addressed the aircraft noise challenges set by the ACARE Vision for 2020.

The project scope is fully consistent with the FP6 workprogramme on Aeronautics and Space, significantly contributing to the objectives of reducing aircraft external noise by 4–5 and by 10 dB per operation in the short and long term respectively.

Over 4 years, the project will involve 28 partners from 17 countries. A genuine transnational approach has been elaborated to deal with Aircraft Noise Research issues, combining the complementary skills and expertise of industry partners (14, including 6 SMEs), universities (8) and research establishments (6) to cover the whole field of interest.

This paper describes the work of the X3-NOISE network.

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10. Evaluation of acoustic performance of multifamily buildings, a study on the possible categorisation within open manufacturing system.

Part I. Airborne sound insulation

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Regulations defining the minimum required value of the sound insulation of separating partitions in multifamily residential buildings exist in nearly all European countries. Although the level of requirements around Europe is different. In each case it is a kind of compromise between expectations, comfort and local conditions and possibilities. Different single number indicators are used as the assessment criteria and different minimum values are obligatory. Besides, several countries have adopted classification schemes defining minimum sound insulation, but also higher acoustical classes for buildings of higher comfort and better acoustic quality.

The paper investigates the possibilities to develop unified acoustic classification scheme for the use within open manufacturing system, the assessment criterion similar to the number of stars describing hotel quality, the class of a car or e.g. the energetic class of a fridge. Because of the great differentiation of the approach to building acoustic requirements around Europe the analysis is focused on airborne sound insulation only. Impact noise problems should be analysed separately then combined with airborne.

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11. The localisation of sound sources – studies od sound field

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Research of sound fields around sound sources allows to find their acoustical parameters. It is important to know localization of sound sources and its sound power. Authors try to apply the multichannels data acquisitions systems to examine parameters of sound fields and using inverse methods for defining

sound sources. This paper presents the preparation of instruments to study program leading to make use of inverse methods in vibroacoustic researches.

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12. The vibroacoustics studies of vibratory conveyer

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Authors used the short vibratory conveyer in our vibroacoustics experiments. They measured and recorded the sound pressure and vibration in three directions in the same time. Those measurements allow to determine the sound power of vibratory conveyer. Additionally authors calculated coefficient of the radiation efficiency. It may be determined this by measuring the average sound pressure level produced in the room, the velocity level of radiating area and the absorption area (the reverberation time) of the room. Further were defined either the index of radiated energy and the index of energy transmission. This paper presents results of those investigations.

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13. The localisation of areas of increased vibroactivity with the multi-microphone method

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Increased possibility of parallel data acquiring and transforming them effectively with the increase of calculation possibilities made the inverse methods more important. In the article there are presented some examples of research, carried out by the authors, during which the possibilities of localisation areas of increased vibroactivity were studied using the multi-microphone method. There were also presented the theoretical basics of the inversion method of sound sources localisation and room laboratory tests' results.

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14. Modal analysis of cable bolts as a way to examine safety conditions in weak strata

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The rock bolt support system plays a great role as an element of safe maintenance of roof sections in coalmines. Cable bolts are inserted additionally and are designed to be used in rock reinforcement near workings in weak strata with lower strength.

The crucial part of the rock bolt support system (grouted in drill holes) is invisible to an observer positioned in a roadway. The inspection of rock or cable bolts integrity after installation is very difficult or even impossible. As the method for non-destructive identification of continuity of a resin layer of grouted rock bolts was already invented by the author the similar approach was made in relation to cable bolts.

The method uses modal analysis procedures and is based on a transverse impact excitation. As the installed and pre tensioned cable bolt acts as an oscillator, different lengths of discontinuity of resin layer

change its modal parameters. By proper extraction of these parameters and theoretical modal analysis of Finite Element (FE) models the intended identification is possible.

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15. All-weather microphones in monitoring systems

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Intensive development of technological civilisation caused that noise and vibrations became very burdensome for contemporary life. Calculation procedures based on various algorithms are most often applied for the determination of noise propagation. However, the results of actual measurements constitute the basis for assessment of the noise zone range around majority of objects (e.g. airports). Such measurements are usually performed simultaneously in several characteristic points by means of various types of noise monitoring stations (stationary or mobile) with properly adjusted all-weather microphones, which are the most important elements of the measuring system.

Essential information concerning properties of all-weather microphones, rules of their classification according to the construction, possibility of calibration and fulfilment of metrological requirements are given in the paper. Main legal information concerning the measuring systems is also presented.

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