CURRENT STATUS ON NOISE POLLUTION IN TRANSPORTS

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Abstract: In this topics is intended to realize both a quantitative assessment of noise emitted by means of transport and solutions and strategies for control and prevention, calculus formulas and schematic diagrams that help realize the proposed objective and attenuation methods them to fight but also their impact on human health.
Keywords: noise pollution, sound, noise, acoustics, wave, frequency

1. INTRODUCTION

In the EU, about 40% of the population is exposed to road traffic noise levels exceeding 55 dBA sound pressure during the day and 20% at levels exceeding 65 dBA [1]. In Romania this percentage is lower becouse of a lower intensity during the night and the fact that a large part of the population (45%) lives in rural areas where the traffic is very low. Noise has on the human body a number of pathological effects. Noise negatively affects human health, affecting first of all the nervous and auditory systems.

In urban areas where the traffic is the first source of noise pollution,the urban design made badly can lead to noise pollution with creating residential areas near the location of industrial units . In nature, the intensity of sound is about 35 dB , while the traffic today produces 90 dB in some places . There are several possibilities to reduce highway noise : the sound barrier , limiting the speed of movement , changing the texture of the road, limiting access of heavy trucks,the traffic control requiring reducing speeding,the development of computational models adapted to a specific location , depending on topography, meteorological , tube sound . [2]

2. LEGISLATIVE REGULATION

Tabel 2.1
Legislative normes by the transports domain

Nr. crt	The title of the legislative normes
1.	- **SR EN ISO 8253-3** , Audiometrical test methods . This standard represents the Romanian version of the European standard **EN ISO 8253-3:1998** . This part of **ISO 8253** establishes procedures and requirements for vocal audiometry , the recorded test material is presented through an audio headset for air tube through a speaker in the case of audiometrical in the sound field audio .
2.	**SR EN ISO 3746 -** Determination of sound power levels emitted by noise sources using sound pressure
3.	**SR EN ISO 4869-2 ,** Individual protectors of noise. In the standard describes three methods: in octave bands , HML method , and the method SRN .
4.	**SR EN 1793-1** -Devices for reducing road traffic noise . This standard establishes laboratory method that allows measurement of acoustic absorption of anti - noise screens flat for sustain pillars or tunnels.
5.	-**SR EN 1793-3**- This standard defines standards noise spectrum of traffic that allows evaluation and estimation of the sound acoustic performance devices, designed to reduce traffic noise near roads ways.

6.	**-Directiva 70-157-EC** Introduce noise emission limits for noise level from motor vehicles and provides specifications on measurable sound levels of sounds systems and noise amortization.

3. TECHNICAL MEASURES TO COMBAT NOISE POLUATION

They refer to the source of noise shielding and protection of human ear and house,even the space in which they operate. Looking for new building materials,whith soundproofing properties and residential premises architecture must take into account the location of the bedroom so as not to be exposed to circulation arters with continuous flux . [11]

3.1.Changing sound source

Changing energy source to reduce the noise , provide the best means of control noise.In where impacts are involved , any reduction of the impact force (even at the expense of force acting on the system in the time period) will dramatically reduce generating noise. [8]

Noise control at source may involve maintenance , replacement of equipment , replacement of equipment or parts of equipment, equipment specification silent, the substitution processes ,the substitution of mechanical power generation and transmission equipment, changing working practices , reducing vibration of large structures such as boards, beams, etc. or noise reduction resulting from fluid flow .

The Replacement of the materials include replacement of the metal whit plastic, an example is the replacement of the sprocket with the chain sprocket units made of flexible plastic material .

The replacement of equipment include the use of electrical tools to a greater extent than pneumatic tools,the use of parts step by step, using rotary shears , using hydraulics rather than mechanical presses , presses use rather than hammers and using strips carriers rather than roller conveyors . [8]
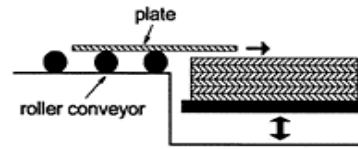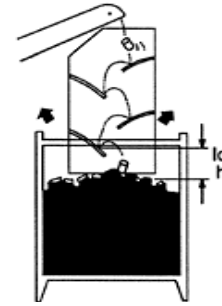
Fig . 1. Graphic representation of the impact of noise reduction : (a) collecting variable height ; (b) fall interrupted. [5]
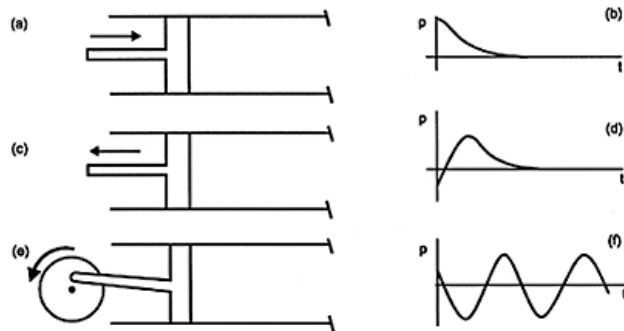
Fig.2. Sound generation illustrated.

(a) The piston moves right, compressing air as in (b). (c). The piston stops and reverses direction, moving left and decompressing air in front of the piston, as in (d). (e) The piston moves cyclically back and forth, producing alternating compressions and rarefactions, as in (f). In all cases disturbances move to the right with the speed of sound.
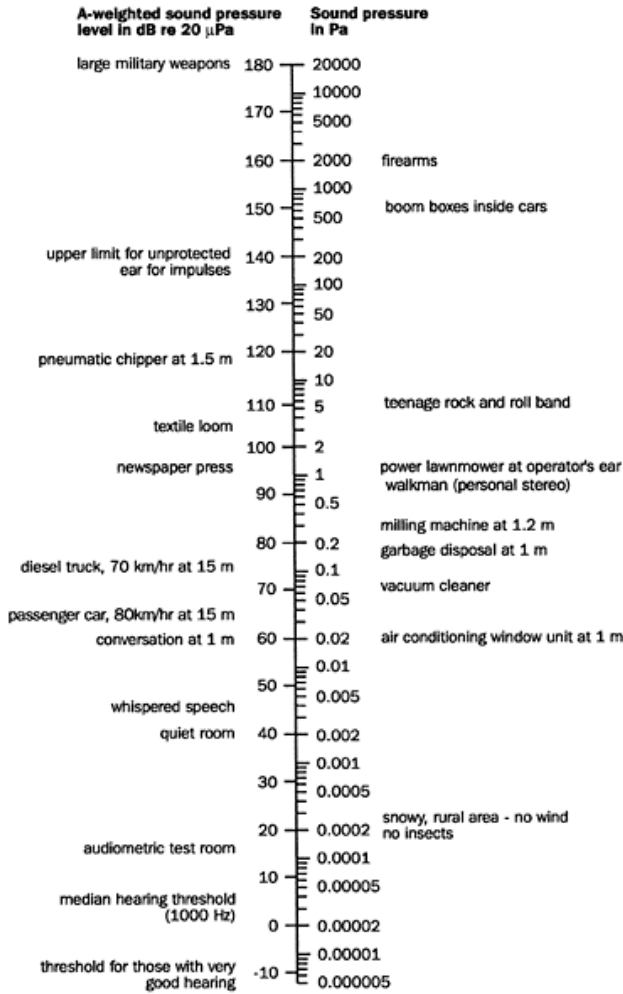
Fig.3. Sound pressure levels of some sources.
[7]

3.2. Movement of the sound wave

When the sound source (assumed pencil) is idle , the sound waves that start from this point are spherical and the wave fronts are concentric spherical surfaces .

If the sound source moves straight line , the centers of spherical surfaces is located on the line that represents the trajectory of the source.

Depending on the speed of the source relative to the speed of propagation of sound , there are three situations:

a) The speed u of sound source is less than the speed of sound v.

Sound waves are not concentric, but presses on the meaning of propagation of the sound source . In this case, for an observer A, in front of mobile , the sound frequency seems higher

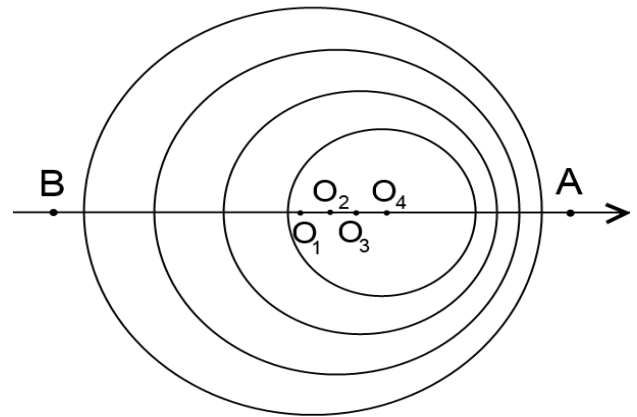(the Doppler effect) , working backwards for a motive placed behind observatory B.

Fig.4. The case when u<v
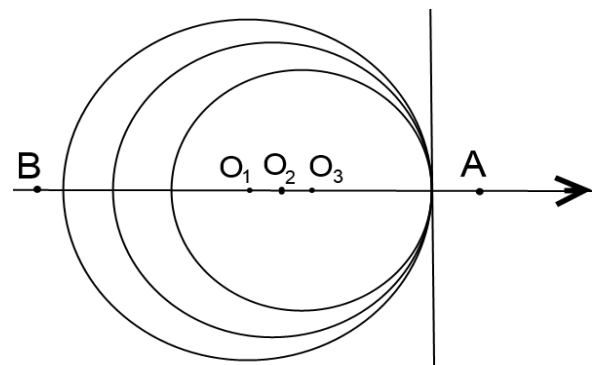
b) The speed u sound wave equals the speed of sound v.

Fig.5.The case when u=v

The spherical waves always have a common point , and an observer is moving in the direction toward the source receives all sound waves as a pop (sonic bang) .

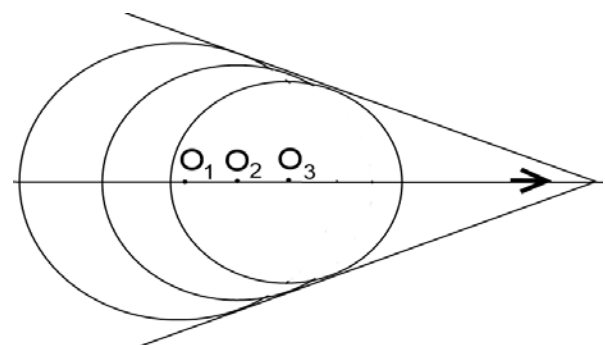c) The u sound wave speed greater than the speed of sound v.

Fig.6. The case when u>v

Intersecting the spherical waves and the envelope of them is a cone with a tip thereof is in the direction of travel, in front of the source.
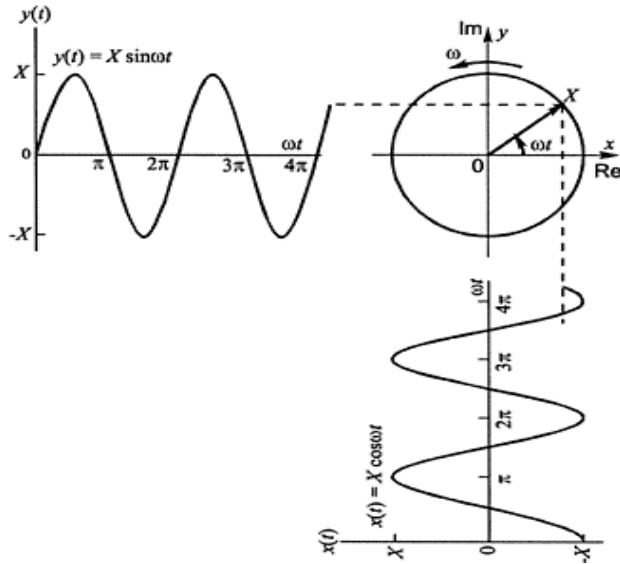
3.3. The propagation of the spherical wave

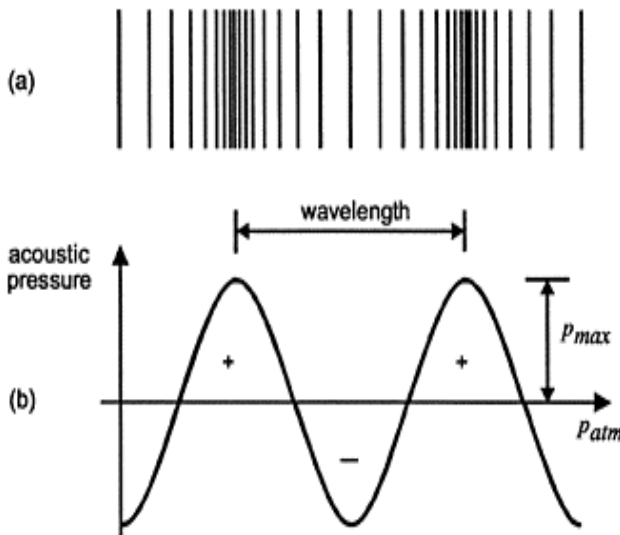Fig.7.The propagation of sound waves from a source of small space, without near limits

Fig.8. Reprezenting of a sound wave [6]
a) compression and refraction of sound waves in space a fixed distance while
b)the variation of sound pressure reprtezented graphics [6]

4. CALCULUS FORMULAS

4.1. The acoustic potential function

It can be note as:

$$\mathbf{u} = -\nabla\varphi \qquad (2)$$

The potential acoustic feature can be used to determine the sound pressure, being, for low speed convection is negligible or absent U and it is given by the following expression:

$$p = \rho\,\partial\varphi/\partial t \qquad (3)$$

At higher sound pressure levels , or if particle velocity is large , equation (6) is as follows :

$$p = \rho\left[\partial\varphi/\partial t \ - \ \frac{1}{2}(\partial\varphi/\partial x)^2\right] \qquad (4)$$

Equation (7) is the gradient in relation to the displacement X along the axis of the hole. Alternatively , if the speed of convection , U is present and is high and the particle velocity u is low , the equation (6) is as follows :

$$p = \rho\,[\,\partial\phi/\partial t - U\,\partial\phi/\partial x\,] \qquad (5)$$

Acoustic potential function satisfies the linearized wave equation as follows :

$$\nabla^2\varphi = (1/c^2)\,\partial^2\varphi/\partial t^2 \qquad (6)$$

The angle of the cone generator and direction is given by:

$$\sin\varphi = \frac{v\Delta t}{u\Delta t} = \frac{v}{u} \quad [13] \qquad [12]. \ (7)$$
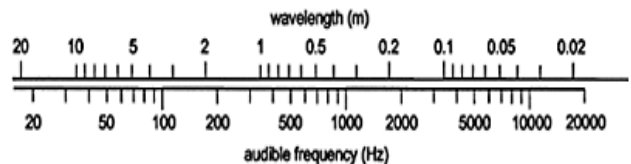

Fig 9. Relation betwen wavelength and frequency [7]

5. REDUCING THE NOISE POLUATION

5.1 The control of vehicles

This applies noise sourcesof the vehicle . Regulations regarding the maintenance and

operation thereof is hoped to decrease the noise level by 5 -10dB .

By the incorporation or registration , vehicles can travel on public roads without technical inspection , based on a provisional authorizations circulation , issued by the competent authority if they realise the technical standards for circulation road safety **.**It inspecting the technical , before being put back into circulation , cars , trams and trailers which have been carried out repairs following serious events that caused damage to the steering , the brakes or the structural strength of body or chassis.

The vehicles that exceed the weight and / or gauge shall be equipped with the following additional signaling devices :

- An identification plate fluorescent - reflective , white background with red frame , mounted on the front left side ;

- Fluorescent - reflective markings applied to the back of the vehicle or load , as close to the sides , composed of alternating bands of white and red , the exterior downward if the vehicle width exceeds 2, 5 m;

- One or more special devices yellow warning light , mounted so that the light emitted by them to be visible from the front, rear and both sides side and device and an reflective fluorescent yellow sides mounted remote 1, 5 m;

- Lights mounted on the sides of the vehicle or load exceeds the width of 2, 5 m, which must run concurrently with side lights and a fluorescent - reflective device . [11]

Fig.10. Controlling vehicles in a service [11]

6.CONCLUSIONS

1. The priorities for noise can be integrated with actions for road safety, air quality bus corridors , bicycle lanes , sidewalks and other improvements .
2. The metods of combating are in the search for more effective ways to reduce noise at source , while use zoning plans , building design , traffic management and other ways to minimize exposure to noise and soundscapes achieving improved.
3. The traffic noise can be diminuate by checking the appropriate periods checkings of the motor vehicles and projects of the roads.
4. A good traffic management can reduce noise to the extent that transport noise poluation is due both cars , buses, trains and infrastructure as necomforme standards .

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STADIUL ACTUAL ASUPRA POLUĂRII SONORE ÎN TRANSPORTURI

Rezumat: In cadrul acestei teme se doreşte să se realizeze atât o evaluare cantitativă a zgomotelor emise de mijloacele de transport,solutii si strategii de control si de prevenire,formule de calcul si scheme de principiu care ajuta la realizarea obiectivului propus precum si metode de atenuare a acestora până la combatere dar si impactul lor asupra sanatatii omului.

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