

THE GENERAL NOTION OF THE SONICITY THEORY

Bal Carmen

Technical University of Cluj Napoca
15. C. Daicoviciu street, Cluj Napoca
Romania

Bal Nicolae

Technical University of Cluj Napoca
102 105 Bdul Muncii, Cluj Napoca
Romania

ABSTRACT

In this paper we present the application of thermic effect on sonicity's theory. The sonic actions permit the best combination of facilities offered by the procesing of electrical signals (reduces energy) with sonical actions of great power and efficiency, which give the possibility of eliminating the biggest parts of a clasical hidraulical system (hidraulic reservoir, valve of regulating the debit), resulting on action which combine the opportunities offered by the processing the signals of low energy and the compact sonic actions, with high efficiency, with reduces volume, so very economic.

Keywords: sonic pressure, sonic flow, sonic circuit, friction resistance.

1. THE GENERAL NOTION ABOUT THE SOCITY THEORY

One of the fundamental problems of mechanic engineering is energy transmission (presented by different forms) at distance, where in a certain point it could be transformed in a useful mechanic thing. The methods of moving the energy into liquids, applied in present, are in general based on continuing transmission of pressure and flow, though these produced at one end of a line, could be taken by the other, the liquid could be considered as incompressible.

The pneumatic methods known suppose a flow into tubes having always the same direction, pressure being produced at one end of the system and used at the other end, in this case the elasticity of the fluid is often used at receivers. The energy in the new system is transmission from one point to other point, at a distance which could be considered considerable, with the help of imparting some periodical variations of compression which produced longitudinal vibrations in solid, liquid or gases columns. The energy with is transmitting through this periodical pressure and volume vibrations in longitudinal direction could be characterized as power transmission through *sonic waves*.

The science which is based on the application of elastic proprieties of matter at energy transmission carry the name of *sonic science* or *sonicity*. The sonicity is different by the hydraulic, in practical applications considered fluids as being practically incomprensible.

The transmission of power through pressure was based upon the elasticity of the environment through witch the energy is transmitted, trough the essence of the method consist in the fact the particles of the used environment are the oscillations assessed to a medium position.

2. THE PRINCIPAL THE SONIC PARAMETERS

If " v " are the *speed* which the wave during by the pipe and the " f " are the circle *frequent* of the crank, than the long of the wave are the expression:

$$\lambda = \frac{v}{f} \quad (1)$$

The sonic flow can be writing:

$$Q_i = Q_{a \max} \cdot \sin(\omega \cdot t + \varphi_0) \quad (2)$$

where: Q_i - are the instantaneous flow,

$Q_{a \max}$ - (the maximum sonic flow) the amplitude of the flow,

ω - the angle speed.

The sonic pressure can be write similar by the sonic flow. Into the pipe we can circulate one alternating flow, the instantaneous pressure " p_i " are:

$$p_i = p_m + p_{a \max} \cdot \sin(\omega \cdot t + \varphi_0) \quad (3)$$

where:

- $p_{a \max}$, are maximum (the amplitude) of the sonic pressure,

p_m - the medium pressure in the pipe.

The sonic displacement " δ_s " are defined by expression:

$$\delta_s = \int_{t_1}^{t_2} Q_i \cdot dt \quad (4).$$

He represents the volume of the fluid misplaced by one period of time $\Delta t = t_2 - t_1$.

The perditance represented any leakage or loss of liquid by a little leaks or any loss of the flow owing to the pressure. The flows that are loss under pressure by the little leaks are proportional with the difference between the pressures.

Write with " C_p " a coefficient called *coefficient of the perditance*, the general law are:

$$Q_i = C_p \cdot p_{Si} \quad (5)$$

The friction show the fact that in the time of the alternative movement the liquids into the pipes are produces the friction by the intern surface to this and in the liquid body. We presume that the differences of the pressure or the sonic pressure need to produce the flow are proportional by this.

The rations for the sonic pressure and the sonic flow can be writing under form:

$$p_{Si} = R_f \cdot Q_i \quad (6).$$

The inertia are the propriety when depend by the movement of the mass, thus one colon of liquid be length " l " can be one hydraulic inertia (inductance):

$$L_S = \frac{\gamma \cdot l}{g \cdot S} \quad (7)$$

where:

γ - the specific weight of the liquid,

S- the interior section of the pipe,

g - the gravity acceleration.

The sonic capacity or the coefficient of the sonic capacity, " C_s " is defined by relation:

$$C_S = \frac{\delta_S}{p_{Si}} \quad (8).$$

In generally, the upper of the sonic displacement are proportional with the upper of the pressure, the proportionality constant are just the sonic capacity C_s .

3 THE DETERMINATION OF THE VOLUME OF THE FLUID NEEDS TO TAKE OVER THE COMPRESSIBILITY OF THE VOLUME DISCHARGE BY GENERATOR.

If we considered one harmonic volume generated of fluid V_g . to one pressure p , between the compression we produce one variation of volume dV_g [2].

$$dV_g = -\frac{V_g}{E} \cdot p \quad (9)$$

For this volume V_g can be taking over in totality by one column of fluid, this can be having one volume V_c , so:

$$V_g + V_c = \frac{E}{\rho} V_g \quad (10)$$

thus:

$$V_c = V_g \left(\frac{E}{\rho} - 1 \right) \quad (11)$$

The generator have one piston with diameter d_g with one harmonic curve from amplitude x_g and the receptor one cylindrical enclosure (pipe), figure 1, from diameter d_c and length x_c :

$$x_c = \frac{d_g \cdot x_g}{d_c^2} \cdot \left(\frac{E}{\rho} - 1 \right) \quad (12)$$

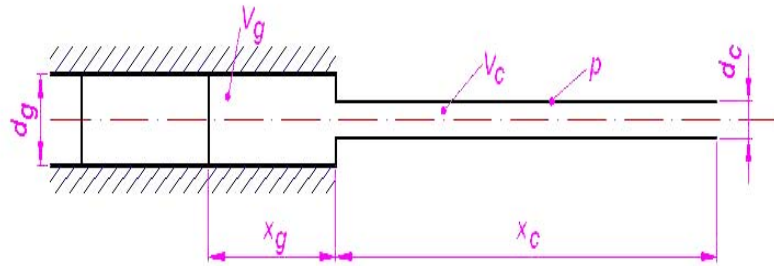


Figure 1. The scheme of the system generator receptor

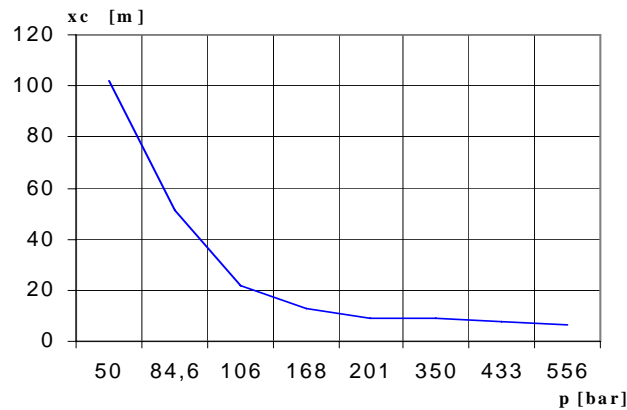


Figure 2. The variation of the length of the pipe x_c by function of the static pressure

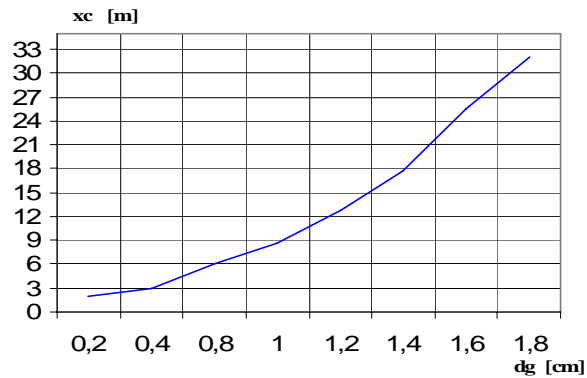


Figure 3. The variation of the length of the pipe x_c in function by the course of the range of the generator piston

The final point of the experiment was the determination of the length x_c of the pipe, which put the all harmonic volume of fluid used by generator can be take over by compressibility of the column of liquid, work realized by the variation of the characteristic parameter of the system.

Figure 2 represent the variation of the length of the pipe x_c by function of the evolution of the static pressure on system.

In the figure 3 realized the variation of the length of the pipe x_c in function by the course of the range of the generator piston.

In conclusion we can underline that in function by the size of the generator piston used by the diameter of the pipe used for the transmission of the wave of pressure and also by the static pressure on the system, we need the pipes who have length by ten or hundred meters for the all harmonic volume to fluid deliver by the generator to take over by compressibility of the liquid column.

4. REFERENCES

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