The Frictional effects in serial harmonic circuit

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ABSTRACT:
In the paper we make the friction effect in the serial sonic system were the sonic flow are influence by the friction. This effect makes the growing of the temperature in the sonic resistance, same the caloric effect of the alternative current. This paper is the base of departure for the future research about the caloric effects of the sonicity theory in the practice.

Keywords: sonic pressure, sonic flow, sonic generator, perditance, sonic, resistance, inertia.

1. INTRODUCTION

In the last time, the development of the science and the technicians are realised the big progress and the level of the general knowledge of the persons implicated in this activity are advances and probable the knowledge of the sonicity are not brake by the wrong idea or disregarded by "incompressibility of flow" (Constantinescu Gogu, 1985).

Sonicity is the science of transmitting mechanical energy through vibrations. Starting from the theory of the musical accords, Gogu Constantinescu (1985) found the laws for transmitting the mechanical power to the distance through oscillations that propagate in continuous environments (liquid or solid) due to their elasticity.

The sonicity theory is an old field, though new from the perspectives which it offers: the possibility of development and application of the principles exposed in the sonicity's theory.

The sonic actions permit the best combination of facilities offered by the processing of electrical signals (reduces energy) with sonically actions of great power and efficiency, which give the possibility of eliminating the biggest parts of a classical hydraulic system (hydraulic reservoir, flow-adjustment valve), leading to an action which combines the opportunities offered by the processing of the signals of low energy and the compact sonic actions, with high efficiency, with reduces volume, it is very economic (Gogu Constantinescu, 1985). Here it has to be mentioned the fact that, this theory is a particular case of power transmission through movement (Carmen Bal, 2007).

2. THE PRINCIPAL PARAMETERS OF THE FRICTION CIRCUIT IN THE HARMONIC FLOW

If "v" is the speed with the wave circulate of long of the pipe and "f" the circular frequent to the crack, than the long wave is give by the relation, e.q 1:

$$\lambda = \frac{v}{f} \tag{1}$$

The sonic flow (Carmen Bal, 2007) can be experimented by form, e.q 2:

$$Q_i = Q_{\mathrm{a}_{\max}} \sin(\omega t + \varphi_0) \tag{2}$$

were: Q_i – represent the instantaneous flow;
$Q_{\mathrm{a\ max}}$ – the maximum sonic flow or amplitude flow;
ω – frequency anglular.

The *sonic pressure* can be writing similar with the sonic flow in the pipe when are presuming one alternative flow, the instantaneous pressure (Carmen Bal, 2007) are, e.q 3:

$$p_i = p_m + p_{\mathrm{a}_{\max}} \sin\left(\omega t + \varphi_0\right) \tag{3}$$

were: p_m – represent the medium pressure in the pipe;
$p_{\mathrm{a}\ max}$ – maxim (amplitude) of the sonic pressure.
The *sonic displacement* δ_s are defined which the relation (Carmen Bal, 2007), e.q 4:

$$\delta_s = \int_{t_1}^{t_2} Q_i \, dt \tag{4}$$

represent the capacity of displacement in the time period $t_2 - t_1$.

The *inertia* is the propriety when depend the mass movements, so one liquid spout is "l" length, have hydraulics inertia, e.q 5:

$$L = \frac{\gamma \cdot l}{g \cdot S} \tag{5}$$

when: γ= is a specific gravity of the liquid;
S – the interior section of the pipe;
g – the gravitational acceleration.

The *sonic capacity* or the coefficient of the sonic capacity, C_s is defined by the relation, e.q 6:

$$C_s = \frac{\delta_s}{p_{s_i}} \tag{6}$$

in generally, the growing of the sonic displacement is proportionally which the growing of the pressure, the proportionality constant is the sonic capacity C_s.

The *perditance* (Carmen Bal, 2007) represented all lost of the liquid in the little interstice or other lost of the flow result from the pressure. The flow that is lost down of the pressure is proportionally by the defence of pressure. Noted by C_p the coefficient of the perditance, can be experimented by form, e.q 7:

$$Q_i = C_p \cdot p_{s_i} \tag{7}$$

are defined which the relation, e.q 8:

$$C_p = \frac{Sl}{E} \tag{8}$$

The friction reflected the fact that in time of the alternant movement the liquid into the pipe produce the friction to the interne surface to this and also in the liquid corp. We can suppose a deference of the pressure or sonic pressure need for produce the flow (the current of liquid) is proportional of this.

The relation of the sonic pressure [4] and the instantaneous flow can be writing by form, e.q 9:

$$p_{s_i} = C_f(R_f) \cdot Q_i \tag{9}$$

or e.q 10:

$$C_f = \frac{k\gamma l}{g S} \tag{10}$$

3.THE FRICTIONAL EFFECTS IN SERIAL HARMONIC CIRCUIT

In the new system, energy is transmitted from one point to another by covering distances which can be large, by applying periodical compressions which generate longitudinal vibrations in columns of solids, liquids and gases. The energy transmitted through these periodical longitudinal pressure and volume vibrations is in fact power transmission through sonic waves.

This concept enables obtaining thermal effects through fluid motion or/and synchronous, non-synchronous, single-phase actuation when using a small volume of non-polluting fluid, such as water. The effect of this solution is that one can eliminate the individual equipment for flow and pressure adjustment and control by transferring them in the modern domain of computerized electronic control.

We considered the sonic system formed by with one capacity cylinder and one friction resistance (figure 1). Is formed by sonic generators who are connecting by the friction resistance R_f. with a pipe, this resistance is connected also by a pipe to the capacity cylinder. The capacity of cylinder are V = 1462,411·10^3 mm^3 [2].

After the work of the experimental dates obtained from the three sensor place in the system, are results the primary histograms represented in the figure 2, this show the evolution of the generator pressure and also the pressure to the extremity of the capacity cylinder. Also we can see the revolution of the generator. The evolution of the pressure curve to notice the existence the phases difference by the generator pressure and the pressure of the capacity cylinder.

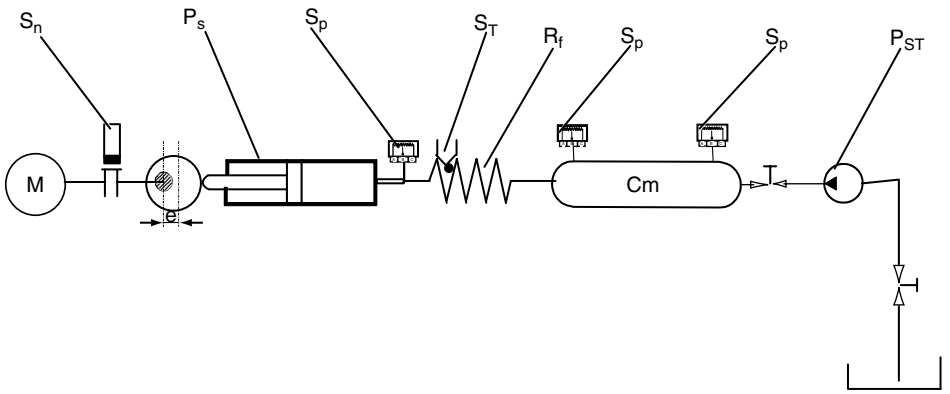

Figure 1 The experimental sonic system with one capacity cylinder and one resistance.

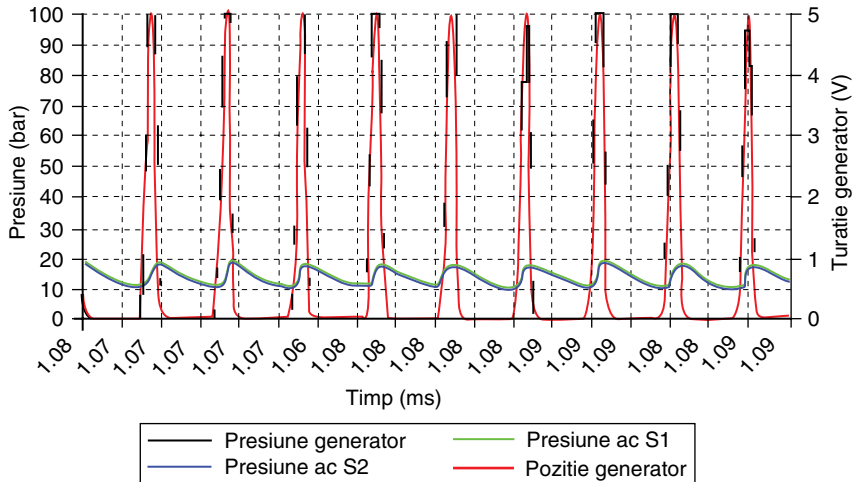

Figure 2 The variation of the pressure in time in the case of the installation.

In the experimental graphics we are noted with:

ΔG – the variation of the generator pressure;

ΔS_1 – the variation of the pressure obtained by the first sensor of pressure place to the left of the capacity cylinder

ΔS_2 – the variation of the pressure obtained by the right sensor of pressure placed to the capacity cylinder;

T – temperature

For make in evidence the effects of the friction we can study the effects of the sonic pressure in the system. For this we can have charge the system with static pressure. For same static pressure (1 bar) we obtained the diagrams for this charges.

The diagrams presents in the figure 3 and 4 are realized for a 1 bar static pressure, and 1667 r.p.m. We be found when the pressure by the sensors of pressure by the condenser are equal just to 50E + 05 Pa, the generator pressure overtake at 160E + 05 Pa, moment when

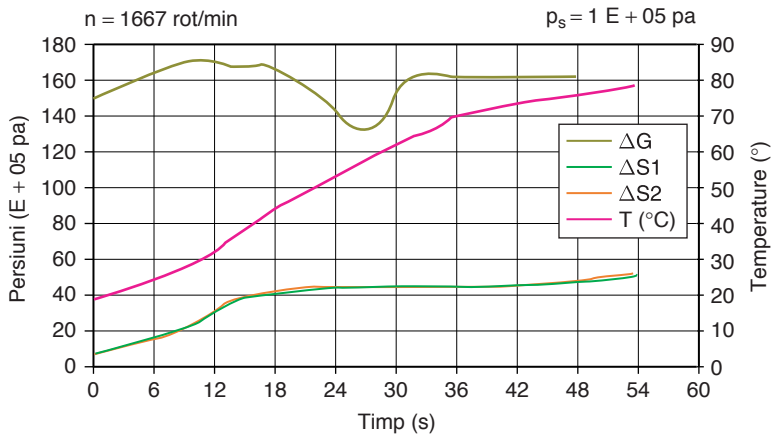

Figure 3 The variation of the pressure to static pressure 1 E+05 Pa.

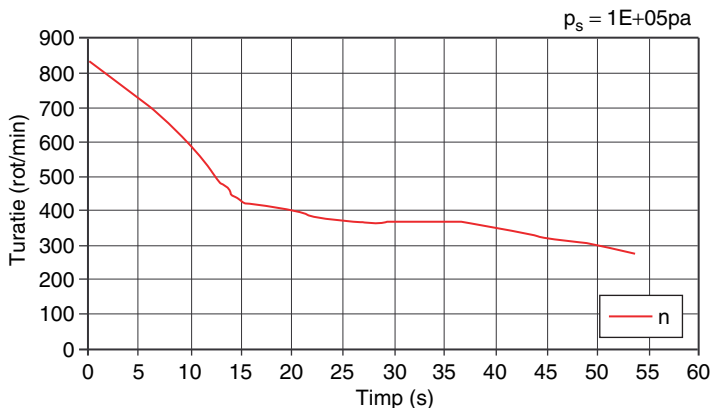

Figure 4 The variation of revolution in time to the static pressure 1E+05 Pa.

are produce the stop to the motor. Because the start of the motor are 1600 r.p.m, in time this rpm of motor decline to 275 rpm and the caloric effect it is realised by the upper of the temperature in the surface of the friction resistance after 50 seconds (Carmen Bal, 2007). The temperatures realized in the installation about the 50 seconds to work are 85°C.

4. CONCLUSION

The analyzing of the diagrams we can draw the ***conclusions***:

1. The big influence to upper of the pressure also of the temperature in the installation are the revolution, thus when to the start are upper so much rapidly upper the pressure ant the temperature of the friction resistance;
2. The static pressure by installation not influence the upper of the temperature realized;
3. If the electric motor is stopped after a short period of time, we not recommended the construction of the serial installation formed by one friction resistance and one cylinder (Carmen Bal, 2006).

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