„THEORY OF SONICS" NATURE

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Abstract: It proposes a variant of calculation which highlights the electrical nature Theory of Sonics.

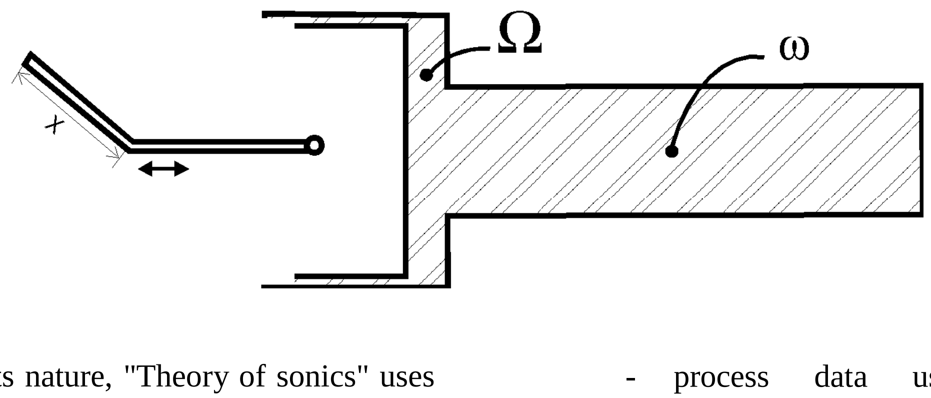
Key words: Elicoidal Spring, Teory of Sonics

INTRODUCTION

By analyzing the fundamentals that "Theory of sonics "is an area border, interdisciplinary, connecting mechanical and electrical engineering because of fundamental similarity between mechanical wave propagation and electromagnetic wave propagation through an environment. Because of this similarity was possible in Sonics:

- current concept i and defining the sonic pressure h;
- defining quantities of material **R**, **L**, **C**, **G**,

thus facilitating the possibility of an infinite number of connections between the two disciplines.



By its nature, "Theory of sonics" uses electrical specific physico-mathematical device as follows:

- take initial data in mechanics, turning them into sonic sizes;
- process data using specific physico-mathematical electrical engineering device;

- convert the final result, giving it meaning from mechanics.

Sonic circuits with concentrated parameters

Parameters features

1. **The current intensity sonic i.**

Consider a piston performing a reciprocating motion in a cylinder section Ω [m2] tied to a pipe section ω [m2].

Drum and pipe are filled with liquid.

Displacement amplitude (Mon-GIME equivalent to crank engines) is r [m], frequency of movement is n [s-1] and the pulsation of [rad / s] with [rad / s] t the movement [s].

As a result of the alternating movement of the piston will propagate in the pipe longitudinal mechanical waves, the speed of the liquid particles of the wave front of v [m / s].

So the line there will be a sonic alternating current (AC output) given by:

$$\mathbf{i = v\,\omega \quad [m^3/s].}$$

Sonic alternating current in the pipeline is connected to the sonic flow in the cylinder alternately, by the relation:

$$i = I\sin(at + \Psi)$$

were:

I – sonic current amplitude $[m^3/s]$;

t –time [s];

Ψ – phase angle [rad].

RMS current is defined sonic equation:

$$I_{ef}^2 = \frac{1}{T}\int_0^T i^2 dt = \frac{I^2}{2} \qquad (2)$$

and the actual amount of particle velocity of the wave front through the relationship:

$$v_{ef} = \frac{I_{ef}}{\omega}$$

δ volume of liquid displaced by the piston during a race will be:

$$\delta = 2r\Omega = \frac{2I}{a} \quad [m^3]$$

and in line wavefront particles will travel the distance:

$$f = \frac{\delta}{\omega} = \frac{2I}{a\omega} \quad [m]$$

For given values of current and sonic pressure, sonic resistance is greater, since the pipe diameter is smaller.

2. Sonic pressure**, h**

If a pipe filled with liquid and there is an alternative sonic current can be defined in a similar manner an alternative pressure p according to the formula:

$$p = H\sin(at + \Psi) + p_m$$

were:

H – alternative maximum pressure [N / m2];

ψ – phase angle;

p_m – The average pressure in the pipe

- Pressure p overlapping alternative than average pressure pm, meet two extreme cases:

- The absolute minimum pressure in the pipeline:

$$p_{min} = p_m - H$$

- The absolute maximum pressure in the pipeline:

$$p_{max} = p_m + H$$

If P1 and P2 denote by the instantaneous pressure at two different points of alternative liquid column difference:

$$h = p_1 - p_2 = H\sin(at + \Psi)$$

spring mass M [kg].

It is defined as the instant sonic pressure and amplitude H them.

Actual amount of sonic pressure will be:

$$H_{ef} = \frac{H}{\sqrt{2}}$$

Exemplifying this way can be done when measuring the speed of sound through a coil spring, in which case no argument using formula

$$v = \frac{1}{\sqrt{\underline{LC}}}$$

on measuring the speed of propagation of electromagnetic energy through a long line:

This example is a coil spring for which we can measure the values of:

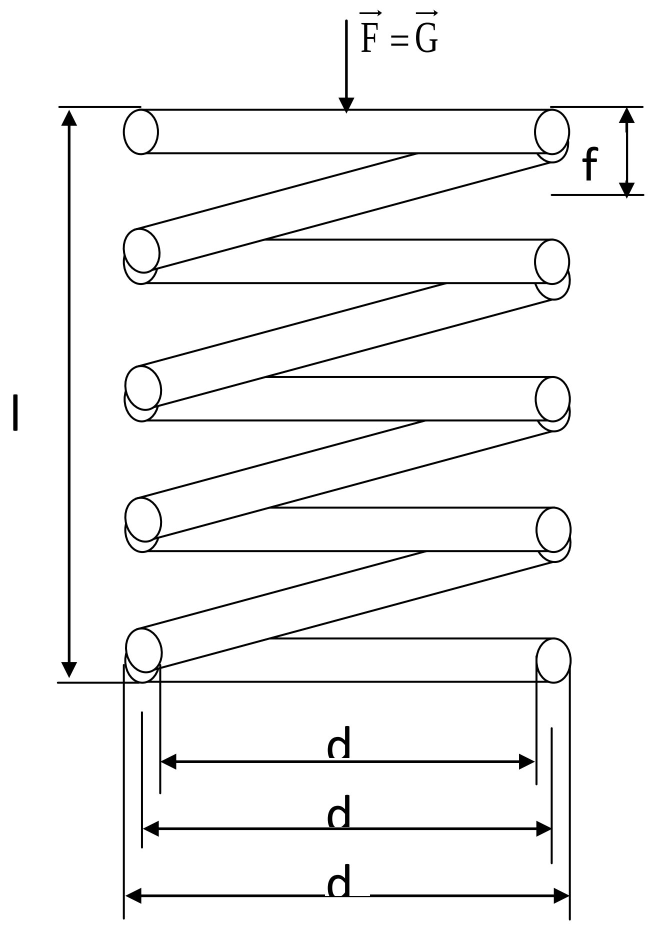
- arc length l, [m];
-
- external diameter d_e , [m];
-
- inner diameter d_i , [m];

The average diameter [m],

$$d_m = \frac{d_i + d_e}{2}$$

cu which is calculated by using the middle section of the spring

$$\omega = \frac{1}{4}\pi d_m^2$$



$$C = \frac{f\omega^2}{F} \qquad L = \frac{M}{\omega^2}$$

$$\underline{C} = \frac{C}{l}; \ \underline{L} = \frac{L}{l}$$

$$v = \frac{1}{\sqrt{\underline{L}\underline{C}}}$$

$$[v] = \frac{1}{\sqrt{\frac{m^3 \cdot s^2}{kg} \cdot \frac{kg}{m^5}}} = \frac{m}{s}$$

It proves using specific formulas of long lines electrical theory so that the we can calculate the speed of sound in an arch, which is in turn considered long line.

Furthermore, it demonstrates that in an finite dimensional medium, speed of sound is dependent on the geometric shape of the environment.

REFERENCES

1. Teoria sonicității – Gogu Constantinescu, Editura Academiei RSR, 1985;
2. **4. Tătar Adina Milena**," Monitoring of air quality in the city area *Rovinari",* Analele Universitatii „Constantin Brancusi" din Tg Jiu, Seria Inginerie, Nr.3/2013, Tg Jiu, Romania, ISSN 1842-4856,pag. 156-161
3. Extraterestrul român, Nicolae Tesla – Valentin Ovidiu Vâzdoagă, Editura Obiectiv, Craiova.
4. **Tătar A.,** Atmospheric pollution in area Career Gârla, International Symposium on Advanced Engineering & Applied Management 40th Anniversary in Higher Education (1970 - 2010), Hunedoara, România, Nov. 2010, ISBN 978-973-0-09340-7, pag. 13-16