TECHNICAL UNIVERSITY OF CLUJ-NAPOCA

ACTA TECHNICA NAPOCENSIS

Series: Applied Mathematics, Mechanics, and Engineering
Vol. 59, Issue II, June, 2016

BRIEF HISTORY OF VIBRATION RESEARCH WITH ACTION ON THE HUMAN BODY

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Abstract: *The paper contains a brief history of the research of vibrations from ancient times until now. The work is for preparing concepts and explanations that are necessary for defining the study of vibration on the human body action.*
Key words: *brief history, vibration research, action on the human body*

1. INTRODUCTION

Mechanical vibration, their presence and influence on the human body represents an area particularly interesting, important, studied, researched in order to understand better how can man "function" in optimal conditions and how the influence of vibration may to change the quality of life in the positive sense – claiming health, or inducing the human body disharmony.

Mechanical vibration that acts on the human body, which are either part of its life, claiming an. These vibrations are the internal ones that more often than we are not aware them, such as vibration due to the myocardium, the lungs, or of the scheleto-muscle structure. Without these The internal vibrations man cannot survive.

The vibrations can be external regarding the human body, and they may be exerting an exterior action on the human body.

The action together of two natural vibration of the internal and external souces, given by through vocal transmitter vibrations to the ear eardrum receiver of vibrations, respectively, through the process which takes place more often than the communication between people. Convey emotions using vibrations, feelings, ideas, opinions, information.

2. BRIEF HISTORY OF THE DISSERTATION CONCERNING THE EXISTENCE OF VIBRATIONS

It is assumed that people became interested in vibration with creating musical instruments. On the year 4000 BC the music was appreciated in China, India, Japan, Greece and ancient Egypt. There were stringed instruments similar harps, initially with three or four strings, that broadcast a single chord sound. In a tomb from Ur was turned up a harp having gold decorations with 11 strings dating back to 2000 BC. Also have turned up drawings harps on the walls of Egyptian tombs dating from the year 3000 BC (b.cr.).

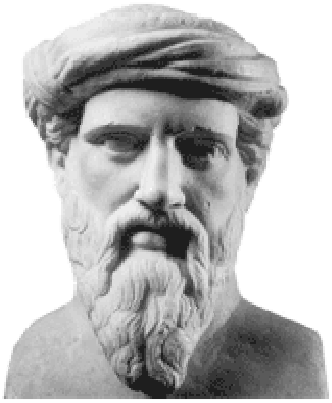

Fig.1. Pythagoras

The current system of mus is based on the Greek philosopher and mathematician

Pythagoras (582-507 BC). He studied with the help of a device called mono – chord, the sound of rope beeing in tension (Fig. 2).

Fig.2. First tool for the study of vibrations

Aristotle in 350 BC made some remarks about music and sounds. A disciple of Aristotle, Aristaxenus has published a paper in 320 BC in three volumes numită "Elements of Harmony". Euclid also wrote a treatise in the year 300 BC, called "Introduction to Harmony".

It seems that the Romans have taken from Greek music knowledge, with the exception of a famous roman architect Vitruvius, who has prepared a paper on the acoustic characteristics of the theaters, rediscovered in the 15th century. Then for sixteen centuries haven't developed anything regarding the theory of sounds and vibrations.

3. STUDY OF VIBRATIONS ALONG THE TIME

3.1. The study of vibrations of the Earth

On the next musical instruments studied involving vibration, in China due that was many earthquakes, Zhang Heng the history and the astronomer of second-century, has developed a tool for measurement of the earthquakes were invented the first seismograph (Fig. 3). It was from copper and has a diameter of around 1.90 m.

3.2. First Steps in Acoustics

Until Galileo Galilei (1564-1642), mathematician and Professor of mathematics, precision mechanics and astrology at the University of Padua, have not established a relationship between frequency, length, tension, and density. His father was a singer at “lauta”, but was and the music theorist, as well. He found that the sound height is proportional square root of tension rope. Galileo Galilei carried out calculations of pendulum oscillations (Fig. 4). For the first time brings the discussion the vibrating bodies inside with resonance effect. He is considered the father of modern science by his entire activity.

Fig. 3. A replica of the first seismograph

Fig. 4. Galileo Galilei

The mathematician and theologian frances Marin Mersenne (1588-1648) in his "Harmonicum Liber" publiched at 1636 measured for the first time the frequency of a long ropes and sets the frequency of a short ropes

having the same density and tension. It is considered by some the father of acoustics.

Isaac Newton (1642-1727) published his "Philosophia Naturalis Principia Mathematica"-1686 describing the laws of physics and the second law of dynamics, that later been used in the differential equations of motion from bodies which vibrate.

The dinamic solution to the theoretical problem of vibrating rope was given by mathematician Brook Taylor in 1713 which presented and the theorem of infinite series. They were the beginning of the partial derivatives of the equations of motion of Daniel Bernoulli (1700-1782), Jean D ' Alambert (1717-1783) and Leonard Euler (1707-1783). They have activated in this field B. J. Fourier (1768-1830) and Joseph Louis Lagrange (1736-1813).

Starting with of industrial revolution in the end of the 18th century and the first decades of the 19th century had numerous inventions and innovations, which has led to the emergence of new technologies. Is dezvolted in the beginning of the 19th century theory of nonlinearetes vibration. Appear engines, turbines, machinery for the textile industry, then for the exploitation of extractive and deposits. The processes continue and human life is changed, the people radical acts now in the presence and under the influence of vibrations.

4. HISTORICAL OVERVIEW OF THE STUDY ON THE HUMAN BODY VIBRATION ACTION

Application of vibration in the rehabilitation treatment has been practiced since antiquity by the Greeks, who covered a blade band in cloth to transmit vibrations to the limb in crisis.

Why athletes attended the Olympics were preparing before competitions using mass oscillators (akin to the balance maintained on a plate placed over a ball) he produced the effect through mechanical action, improving balance, posture, and tone without circulatory activity altering cardiac rate and without any stress deriving from the exercise.

It's the same principle that during locomotion, the contact of the foot with the ground generates train vibrations, and it is transmitted in the entire body, starting with your feet and up to the head, passing through the lower limbs, column and skull.

In the early 1900s, John Harvey Kellogg was one of the pioneers of the construction of platforms, seats and vibrating bars, in medical purposes field [D 06].

Biermann (1960) of Eastern Germany has developed a technique that can be considered prior to the training methodologies by applying vibrations until today [Dan 06].

In the 1960s and 70s, two Soviet scientists named Nasarov, and Issurin seized recovery systems for cosmonauts (Fig. 5) intended for preserving that returned from missions. Because the results obtained on the cosmonauts were significant, such a system was transferred in 1970 and in sport for high performance. The system has been a closely guarded secret for many years, until the breakup of the USSR [Jos 05].

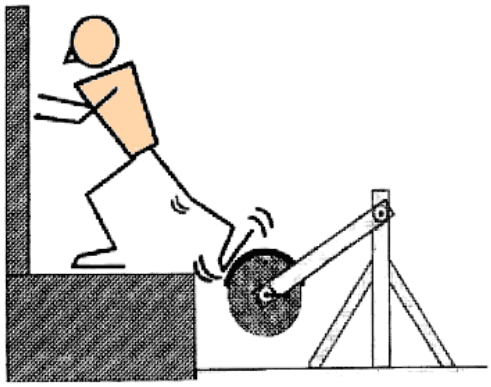

Fig. 5. Device and method for training through his Nasarov vibration [Dan 06]

In 1990, Guus van der Meer – Dutch Olympic coach is the first to recognize the benefits of vibration techniques on the population healthy and move on to building on this principle, a marketable device [Jor 05].

4.1. Principles of Vibration Action on the Human Body

In the mid-90s, mechanical vibration have been used increasingly more in sports training. The first researches were those relating to the

effect it had on the motor force vibration. Another important point was the research related to the effect of vibrations on the ability of human movement.

The human body has a number of natural reflexes, such as the movement of the eye, the achievement or the land (known under the knee blow administered by the doctor with a rubber gavel). In the same way, the training platform vibrator generates a tonic stretch reflex in the muscles involved, the frequency with which vibrates the platform (the action is conducted on muscles with the same frequency).

During this reflex, muscles contract and relax with high speeds, and the quantity of fibers activated touches 95 to 97% of the muscle fibers. It must be said that most people where conventional drills within a maximum of 40% of muscle fibers [Car 03].

5. CONCLUSIONS REGARDING THE USE OF VIBRATIONS ON THE HUMAN BODIES

Studies conducted by different collective of researchers regarding the action of vibration on the human body are divided, so it shows some of the opinions of researchers in the field.

- in 1994 Issurin and its collective reported increases in of 10.2% through vibration training [Iss 99];
- Bosco and Associates arrive in 1998, they concluded that training through vibration produces an effect of motor learning [Bos 00];
- Mester and the reach collective a year later to a harsh conclusion-training through the vibration has considerable deleterious effect on muscle; It should be noted that Mester has combined training through vibration training with weights at maximal [Mat 03].

Almost all researchers are agreed, however, that the use of training through the vibration of long-stroke lead rather to an inhibitory effect, than the one among them.

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Scurt istoric al cercetării vibraţiilor cu acţiune asupra organismului uman

Rezumat: *Lucrarea conţine un scurt istoric al cercetării vivraţiilor din cele mai vechi timpuri şi până astăzi.Această lucrare este concepută pentru pregătirea conceptelor şi explicaţiilor, care sunt necesare definirii acţiunii vibraţiilor asupra organismului uman.*

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