ON THE TRACK OF THE ENERGY SURPLUS OF A TWO-STAGE MECHANICAL OSCILLATOR BY VELJKO MILKOVIĆ

Introduction

The goal of this work is to try to explain the energy surplus obvious in practice on all the models of a two-stage mechanical oscillator constructed by Veljko Milković (www.veljkomilkovic.com). On the basis of existing laws of physics it has been tried to deduce mathematically and explain physically the fact that I have already personally proved several times in different experiments.

This analysis has been inspired by a work published by Jovan Bebić (http://www.veljkomilkovic.com/Images/Analysis_Jovan_Bebic_1.pdf), therefore this work is at the same time the development and a complement of his work.

In search for the origins of energy surplus a theoretical experiment has been carried out in this work which can be a possible reason for the existence of energy surplus.

- The influence of the centrifugal force during operation of the two-stage mechanical oscillator -

The experiment begins with well-known characteristics of a physical pendulum.

Fig. 1 describes the experiment where the weight of the pendulum with mass *m* free falls from position 1. In this experiment the lever arm to which the pendulum is hung is stationary.

If we disregard the friction force and air resistance, the pendulum will interminably move in the semicircle trajectory from position 1 to position 3, as shown in Fig. 1.

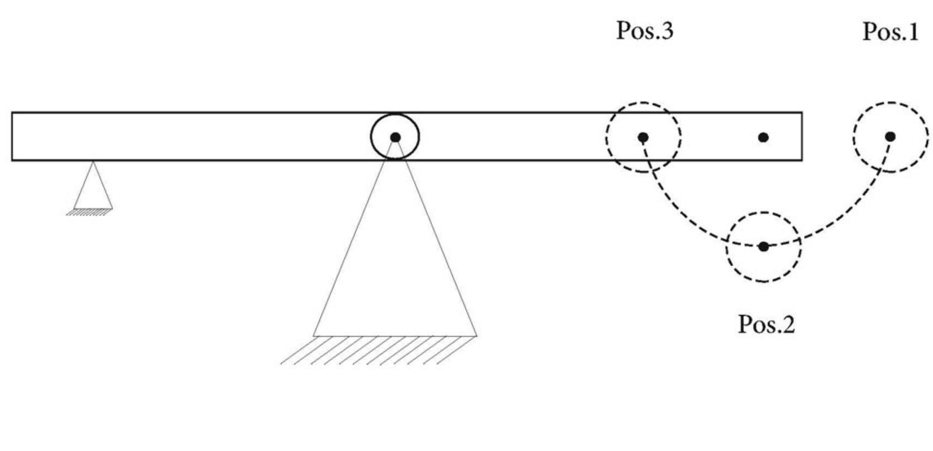


Figure 1.

If the pendulum arm has length h, potential energy of the pendulum body in position 1 is:

$$Ep = mgh \tag{1}$$

Pendulum weight in position 3 has the same potential energy.

In position 2, total potential energy of the weight from position 1 turns to kinetic energy:

$$Ek = \frac{mv^2}{2} \tag{2}$$

i.e. weight with mass m will have the following speed in position 2:

$$v = \sqrt{2gh} \tag{3}$$

Around the position 2 we can perceive a small part of the trajectory that the pendulum follows which may be approximated as straight line.

Given the fact that the centrifugal force equals:

$$Fc = \frac{mv^2}{r} \tag{4}$$

In this experiment, radius of the semicircle trajectory of the pendulum weight r has length h, so that the pendulum weight in position 2 is influenced by centrifugal force:

$$Fc = \frac{m \cdot 2 \cdot g \cdot h}{h} = 2mg \tag{5}$$

In addition to centrifugal force, the weight in position 2 is influenced also by gravity:

$$Fg = mg \tag{6}$$

so that the total force exerted on the weight in position 2 equals to:

$$F_{total} = Fc + Fg = 2mg + mg = 3mg \tag{7}$$

The approximate amount of this force takes effect the weight along the perceived trajectory.

At the beginning of that trajectory kinetic energy of the weight approximately equals kinetic energy at the end of that trajectory, because the trajectory is approximately rectilinear and along it no force influences the pendulum weight.

Let us assume that the axis, from which the pendulum is hung, is lowered by the length Δh during the time that takes the pendulum to move along the perceived trajectory (figure 2).

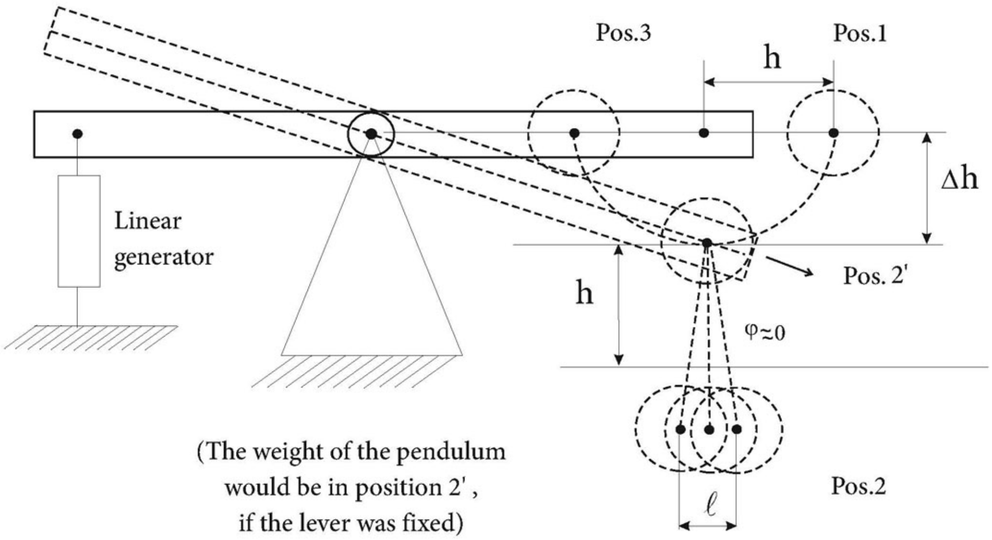


Figure 2.

Along that length of the trajectory the pendulum loses the energy:

$$E = mg\Delta h \qquad (8)$$

but the mechanical work done by the total centrifugal force is :

$$A_{total} = F_{total}\Delta h \qquad (9)$$

i.e. it equals the loss of the pendulum energy.

Assuming that arms of this lever are of equal length this force will be transferred to the other arm of the lever and it will be capable of exerting the same amount of mechanical work.

It is important to emphasize that one of the characteristics of a two-stage mechanical oscillator of Veljko Milković is that a direct coupling of the oscillations of the pendulum and of the lever doesn't exist. They have different oscillation periods i.e. during one oscillation of the pendulum the lever performs two full oscillations!

In order to lift the pendulum to its original height Δh it is necessary to lift the axis around which the pendulum is hung to the height on which it was at the moment of release, in order to renew the oscillation.

It is important to note the difference between the energy invested to lift the axis around which the pendulum oscillates to the original height and the energy needed to lift the pendulum weight to its original height.

The amount of the second energy is:

$$E = mg\Delta h \tag{10}$$

and the energy for lifting the axis around which the pendulum oscillates is considerably smaller. This is due to the fact that when the axis of pendulum is lifted during the rest of the pendulum weight trajectory the total centrifugal force is reduced by factor $\cos\varphi$ because on this part of the trajectory the angle φ cannot be disregarded.

Therefore, the mechanical work for lifting the pendulum axis is now:

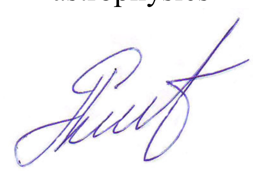
$$A_{in} = F_1\Delta h \tag{11}$$

Conclusion

Given the fact that F_1 is always smaller than the total amount of the centrifugal force which is acting vertically downwards on the pendulum axis for small angles φ, the conclusion is that the efficiency of a two-stage mechanical oscillator by Veljko Milković is always bigger than 1 because $\cos\varphi$ is always less than 1!

In Novi Sad (Serbia)
February 15, 2008

Ljubo Panić
advance university student of astrophysics



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