

# Adequate Theory of Oscillator: A Prelude to Verification of Classical Mechanics Part 1

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*“The essence of scientific discovery relies on the fact  
that one looks at the same what everyone sees  
and notices what nobody has seen.”*

L. Pauling

## ABSTRACT

In the paper, the adequate theory of oscillator is presented, being a sort of prelude to verification of the classical theory of mechanics. The developed theory is based on properly understood the notion of energy, on quantum value changes of its determined measures (potentials), as well as of such changes types of sites of the total energetic states which present the essence of the true principle of energy conservation. General characteristics of classical mechanics is presented by exemplification of artifacts of classical theory of oscillator, energetic aspects of its motion, kinetics of the body in harmonic motion, and finely a new adequate theory of oscillator. This is the first part of the theory.

## Keywords

Oscillator; Energy; Principle of energy conservation; Space-time; Potential field; Gravitation

## 1. INTRODUCTION

According to the presented title, the paper is concerned on the theory of oscillator, being the augury of a cycle of elaborations which are to verify the classical mechanics. Although it refers to the known, commonly accepted theory the Authors are to reveal how far its content has been situated from the nature or natural reality. This presented an adequate theory, is to be the one maintaining in agreement with the oscillator nature, a real oscillator.

The provisioned subject is not a new one but rather as old as the world is. We may expect that there might be some objections against publishing this discovery and thoughts with the argument: this is nothing new. However, they are not any scientific arguments. These arguments do not lead the science on the progress path, as in fact they are directed only to guard/watch that everything what is to be published must be new. It appears, however, that

understanding the novelty is often inappropriate. The form is changed but the core of a thing has the nature of artifact thus deforming the reality and introducing rather a confusion. That way an abstractive thinking takes place, or a kind of searching/investigation which is not based on experience that does not take into consideration the reality, thus leading to a speculation.

It seems to be the classical mechanics have arisen on the ground of such a speculative thinking. That way it forms a sort of scientific jest, calling further the “theoretical mechanics”. Such a mechanics is penetrated by real-fiction hybrids formed by a sort of mathematical treatment of the reality.

## 2. GENERAL CHARACTERISTICS OF CLASSICAL MECHANICS

In the preface to the classical mechanics by John R. Taylor [1] it is stated that at the beginning of the 21<sup>st</sup> century the classical mechanics is as important and effective as anytime before. Further he writes there are three reasons of that. Firstly, there are many interesting physical systems which may be best described using a classical theory language (authors of that book say the best way is to describe it by the truth language). One should understand the classical mechanics to foresee/anticipate orbits of space crafts and paths of charged particles in contemporary accelerators. Secondly, as considered by the mentioned author [1], the latest achievements in the classical mechanics, connected generally with the development of theory of chaos, have caused the originating of quite new sections of physics and mathematics and have changed our understanding of the notion of contribution. These new ideas made the biggest minds in physics again turned into investigation over the classical mechanics. Thirdly, alike years before, right understanding of classical mechanics is indispensable for studying the relativity theory and quantum mechanics.

Naturally, the classical mechanics is very important and attractive. These adjective notations, as one may think, result mainly from the fact, that the classical mechanics is saturated or even satiated with the elements of mathematics. That means unnecessary, excessive, uncritical, credulous usage of mathematical tools, and with this, also turning attention to attraction, complexity, scientific approach (in mathematical sense), and not the will to achieve the principal purpose which is surely an adequate description of the reality. The work [2] discusses this train/issue putting a strong stress on the right selection of mathematical tool for possibly faithful description of the studied reality. The literature [3] says about the most important criterion of scientific approach, truth, and adequate theory.

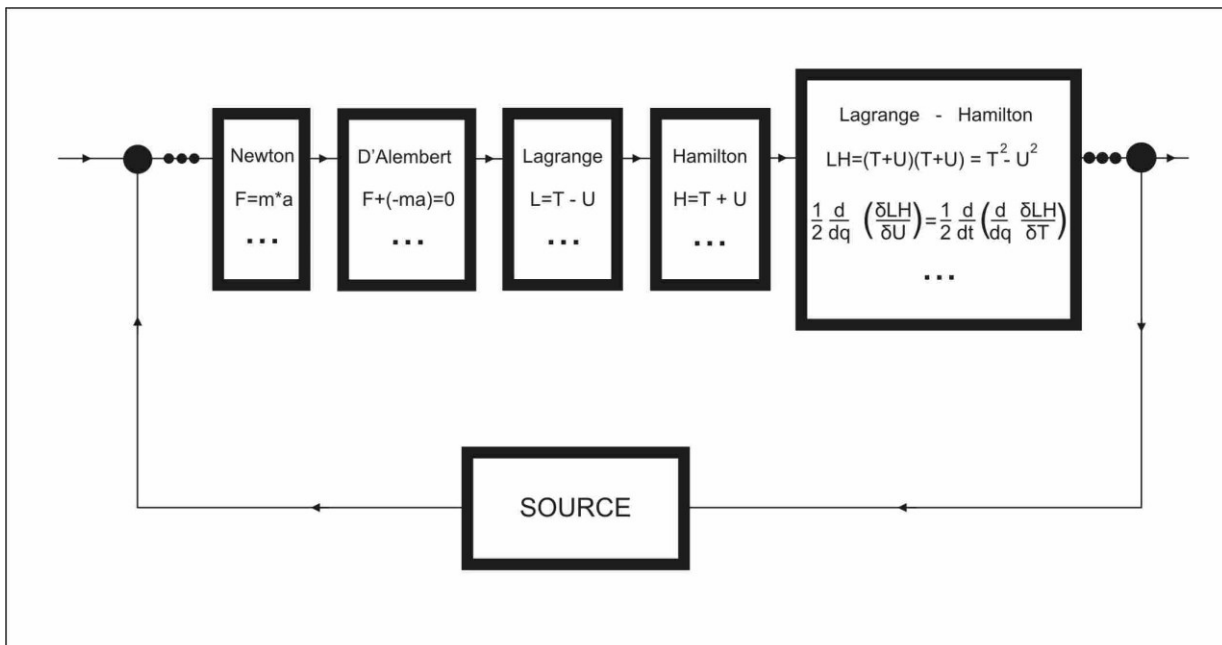
Such a classical mechanics may be understood only formally. It is impossible to understand it fully and properly if there is no adequate description of reality. Anyway it is important to understand the described phenomena and not to understand the meaning of the words and finely to learn them by heart. It results that way the word “understanding” may be understood in two ways, as to know, and/or understand.

Taylor [1] explains that physicists use the determination of “classical mechanics” quite freely. Many of them describe it as the mechanics of Newton’s, Lagrange’s and Hamilton’s, and in their understanding “the classical mechanics” does not cover the relativity theory and quantum mechanics.

It is worth noting that, indicated in the mentioned preface to the cited here literature, there are some serious minds in physics anew to reconsider investigations over the classical mechanics. It is hard to say, however, what is the purpose of that activity: to rebuild existent theoretical mechanics by ornamenting its structure with more newer, more complex and more effective mathematical elements, or just to verify it in view of getting more adequate contents.

Authors of this work wish to be included in this stream/trend of investigations over the classical mechanics, with clearly specified direction of creative activity and the purpose. The difference is, however, that we are not going to proceed the same way, in the same direction, but to get away of this track and go to the source, where the truth of reality is settled. The true description of the reality is the final goal of the work and that requires a verification of the existent knowledge.

The method of provided description is illustrated by a scheme presented in **Fig. 1**. Based on the rule of analogy to the automatic system control, this procedure may be presented as the closed system of verification of classical mechanics. The object of regulation (here: verification) is this classical mechanics, and the source is a specific regulator controlling the state of “adequateness” of the verified object.



**Fig. 1.** Scheme of the closed system for verification of classical mechanics

The object of verification, as presented in Fig. 1, contains some more important theories: Newton's, d'Alembert's, Lagrange's, and Hamilton's, as well as foreseen connections of these theories. There are some exemplary, primary links. In reference to the Newton's theory, we discuss the second law which says that inertia force  $F$  is the product of mass of a body,  $m$ , and its acceleration  $a$ . The next is d'Alembert's principle, the way of introduction to the real systems of so called fictitious inertia force. All other forces are represented here by a symbol  $F$ , whereas the product in parantheses (with sign minus) represents that mentioned fictitious force. Next in the row is Lagrange's function, called

Lagrangian, defined as:  $L = T - U$  (kinetic energy  $T$  minus potential energy  $U$ ). After this there is Hamilton's function, called Hamiltonian, being simply the total energy of the system, then  $H = T + U$ .

At the very end of presented list of theories there is a provisioned, common theory being a sort of hybrid system. It is a product of Lagrangian and Hamiltonian, that is

$$LH = (T - U)(T + U) = T^2 - U^2 \quad (1)$$

being finely the difference of squares of kinetic and potential energy.

Further on there is a properly developed, differentiated record of this function, namely

$$\frac{1}{2} \frac{d}{dq} \left( \frac{\partial LH}{\partial U} \right) = \frac{1}{2} \frac{d}{dt} \left( \frac{d}{dq} \frac{\partial LH}{\partial T} \right) \quad (2)$$

where symbol  $q$  denotes generalized coordinate, and  $\dot{q}$  is the first derivative. The higher record may be read as follows: generalized force equals velocity of changes of generalized impetus.

It seems to be inappropriate to go in this fully "mathematized direction" with clearly reflected latest works from the area of mechanics [1, 4]. One should go away and return to the "source" to take from it the truth about reality and inculcate it to the classical mechanics. Further part of this work is to explain such determined authors' action closer, referred for the time being to the title part of reality, though they carry common features and may be included to other areas of the nature.

### 3. EXEMPLIFICATION OF ARTIFACTS OF THE CLASSICAL THEORY OF OSCILLATOR

An exemplary method of explanation (exemplification) of artifacts of a classical theory of oscillator, or its things deforming the determined reality, is fully justified. It will surely throw a broader light on the considered problem by making possible understanding the essence of fundamental errors which are/occur in particular theories of the classical mechanics. The paper concerns the mistakes and errors which make impossible a physical interpretation of described phenomenon.

Let the three material elements: poles, pillars, and columns, denoted by symbols A, B, C, be the real studied system (**Fig. 2a**). This reality is to be described by not interfering in its structure. It may be done by means of a complex inequality  $h_A > h_B > h_C$ , eventually, as in Fig. 2, by means of three inequalities of type:  $h_A + h_B > h_C$ ,  $h_A + h_C > h_B$ ,  $h_B + h_C > h_A$ . Ascribed to these elements the values enable presentation of these inequalities numerically. Thus one can complete the general description of the presented reality.

There might be somebody who did not like that reality. One decided to change this reality, in fact to obtain an equality. It was done within three stages (Fig. 2b,c,d), with a common for each of them move, relying on the shifting of the coordinate system into the height/level of average pillar.

In the next step (Fig. 2b) the pillar C has been thrown away of the system and the earlier empty space is filled by a fictitious production/work (dotted area). This way the first variant of equality has been achieved, being a real-fictitious hybrid.

As the next step (Fig. 2c) the pillar A has been cut and its bigger part was thrown from the system. The recorded here balance covered just the thrown element and remaining part of the system.

At last the pillar B has been also thrown away (Fig. 2d). It was performed by means of a mathematical tool, that is the reduction. Now the system contains only a part of pillar A, described by height  $h_{1A}$ , and, to say even more, this fictitious part is determined by a dimension  $h_{1C}^*$ .

This way the mathematical treatment of reality is performed. It was the scheme adopted in the past by d'Alembert who formulated his legendary theory, containing unfortunately real-fictitious elements. And this theory lasts until nowadays carrying the name of paradigm

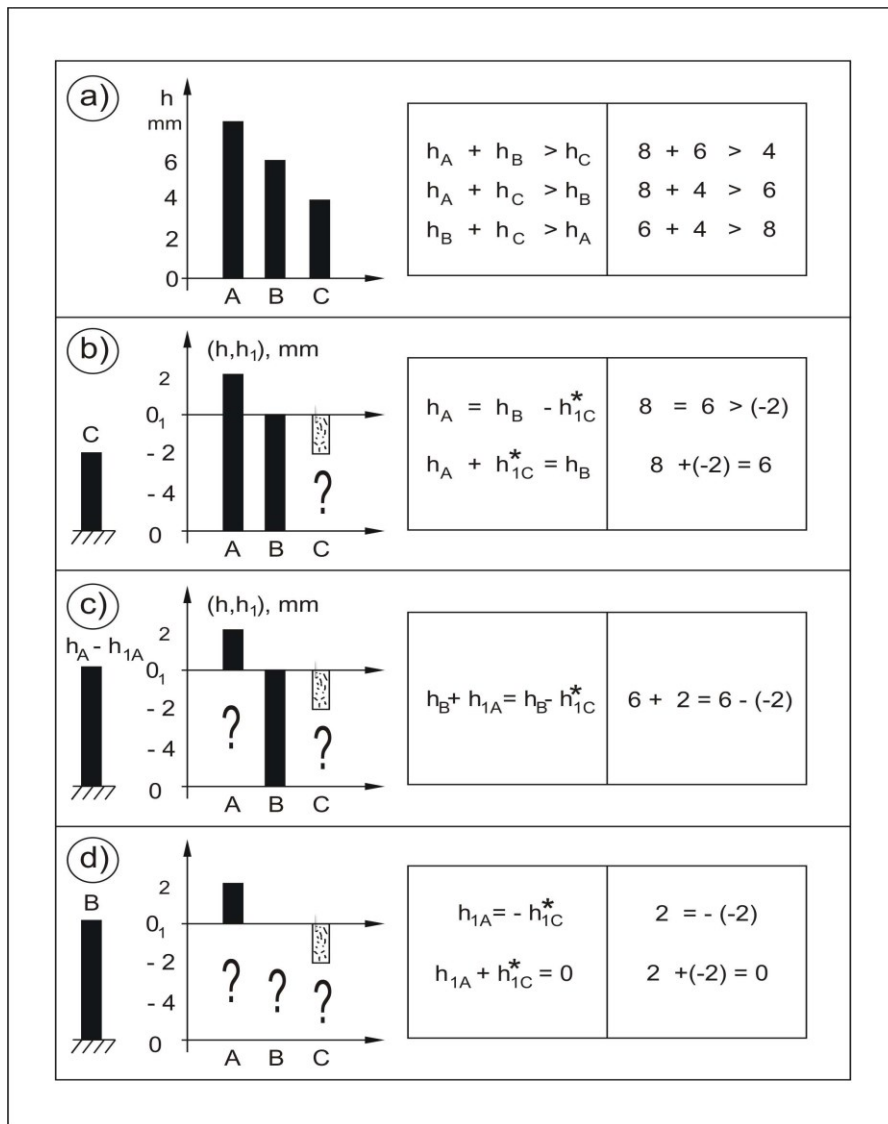


Fig. 2. Real pillar system subjected to treatment by determined mathematical tool

Similar is the course of function presented in Fig. 3a,b,c,s. Very similar procedure was adopted here: displacement of the system from the beginning site of the phenomenon to a determined, handy but not justified physical position; introduction of a fictitious course; at last cutting and throwing away determined parts of the reality.

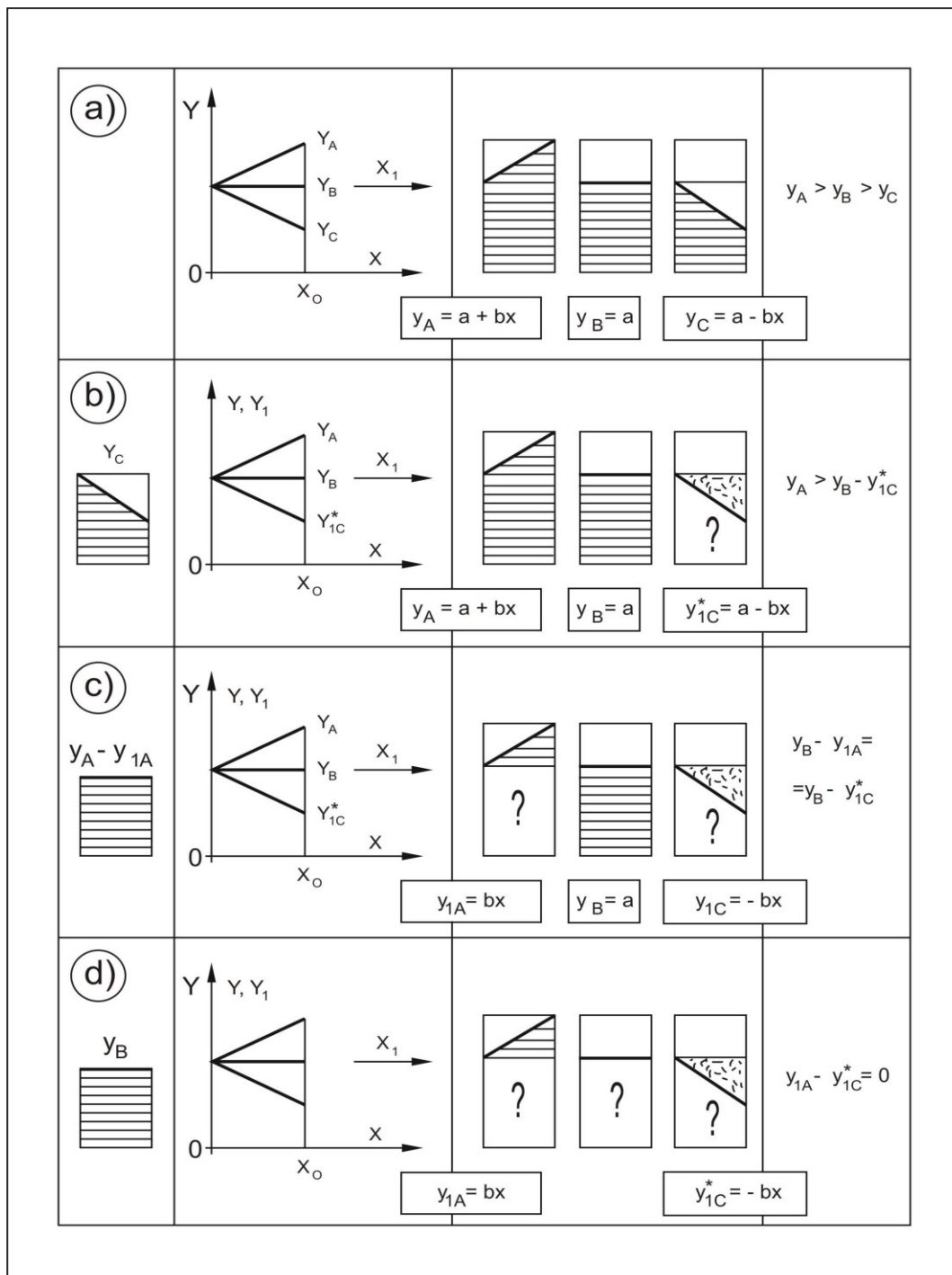


Fig. 3. Functional real system subjected to the mathematical treatment

#### 4. PRIMARY CONCLUSION

At this moment the Authors end this Part 1 with the hope: (a) to conclude the first part of this work with a foreboding for presenting also next its parts consisting of the following Chapters: (b) Energetic aspects of the oscillator motion; (c) Description of the motion of exemplary real system corresponding to existent differential equation of the oscillator motion; (d) Kinetics of a body under the harmonic motion; (e) Verification of the adequate theory of oscillator; (f) Determination of the gravity acceleration by means of mathematical pendulum; and (g) Final conclusion.

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