The Lost Equations in (Classical and relativity) for Accelerated Motion at Very High Speed (Jabr's Equations)

Ibrahim Jabr
Jadara University, PO box 733 Postal Code 21111, Irbid, Jordan
Yarmouk University, Dara'a, Syria
*E-mail of the corresponding author: Jabr.Ibraheem@hotmail.com

Abstract:
since more than three centuries ago the classical theory Created equations of accelerated motion, then the theory of relativity came and explained that the classical theory gives erroneous results at very high speeds, But also the special relativity there are no equations of accelerated motion at high speeds too, The equations of this movement remains missing to this days, Today we are finding these equations according to the study previously submitted (II Bulletin) by IISTE.
Keywords: Jabr's equations of accelerated motion

1. Introduction

1.1 Motion of Charged particles in medium

The Charged particles can be accelerated to speeds close to the speed of light.
When accelerating the charged particles we must to know where the movement is? in the vacuum or in the air (medium) ? The energy spending on the particle is divided into two parts:

1- In the beginning the Energy acted to increase the speed of the particle
2- In the final stages the energy spent on increase of mass depending on the special theory of relativity. This is done in the vacuum, or close to it.

But if it was a move within the medium of the air, for example, most of the energy is spent on radiation, According to classical theory, the mass remains constant!!
The practical experiments confirm that the speed of the particle if increased than 10% C the speed of light the calculations of motion for the speed, the acceleration and the distance become wrong.
In any case, this stage remained without laws to calculate the distance, speed and acceleration. This is the subject of this article.

1.2 Classical Electrodynamics laws

In classical theory the fowling equations for movement we used:
For the distances

$$X = \frac{1}{2}at^2 + V_0 t + X_0$$

a: is the acceleration.
If the mobile set off from rest will be:

$$X_0 = 0$$
$$V_0 = 0$$

Becomes equation of motion is:

$$X = \frac{1}{2}at^2$$

When special relativity appeared and proved its correct became clear the following:
- Change temporal interval and Spatial (time and space) for moving systems at very high speed, i.e. when the speed increases than 10% C where C it is the speed of light.
-This means that the previous equation is not suitable to calculate the distance because the time and spatial are not constant.

1. 3 New Equations of Distances:

The median speed at low speeds less than 10% C of the speed of light.

$$\bar{V} = V_0 + V \qquad \ldots 1$$

$$V = V_0 + a.t \rightarrow a = \frac{V - V_0}{t}$$

Suppose median speed at very high speeds is:

$$\bar{V} = \beta(V_0 + V) \quad ..2$$

$$\bar{X} = \bar{V}.t \rightarrow \bar{X} = \beta(V_0 + V)t \qquad \ldots 3$$

$$\bar{X} = \beta(V_0 + V_0 + V)t \rightarrow \bar{X} = 2\beta V_0 + \beta.a.t^2$$

When primary speed equal zero we find:

$$V_0 = 0$$

$$X = \beta.a.t^2 \qquad ..4$$

$\bar{V} = V_0 + a.t \rightarrow t = \frac{V-V_0}{a}$

Compensate for time t in the equation

$\bar{X} = \beta(V_0 + V)t \rightarrow X = \beta(V_0 + V)\left(\frac{V-V_0}{a}\right) \rightarrow$

$V^2 = \frac{X a}{\beta} + V_0{}^2$ ... 5

....

Or using unlimited integration :

$V = \int a(t)dt + c_1$ ... 1

$V = at + c_1$ ... 2

$t = 0 \rightarrow V = V_0 \rightarrow V_0 = 0 + c_1$ ... 3

The instantaneous velocity:

$V = V_0 + at$ 4

The median speed:

$\bar{V} = \beta(V_0 + V)$ 5

$\bar{X} = \int \bar{V} dt$ 6

Compensation: 5 in 6

$\bar{X} = \beta(V_0 + V)t + c_2$ ... 7

$X = \beta(V_0 + V)t + c_2 = \beta(V_0 + V_0 + at)t + c_2$

$X = 2\beta V_0 t + \beta a t^2 + c_2$

If: $t = 0 \rightarrow X = 0 \rightarrow c_2 = 0$

$X = 2\beta V_0 + \beta a t^2$ ... 8

If the particle was launched from rest be $V_0 = 0$

The equation becomes 8 as follows:

$X = \beta a t^2$ 9

-It is also fixed experience the moving mass also increasingly when speed increases however the force is constant this confirms that the acceleration not constant at increasing of the speed.

-When the theory of relativity came didn't finding equations of accelerated motion it is very clear that the special relativity relation only to the uniform rectilinear motion.

General relativity: Doesn't finding the equations of accelerated motion witch moving at very high speed**.**

Four laws discovered when I was trying develop a "coherent physical formula" I hope to be able to be the first step to unify physics under one theory we can derive from it most of the major theories in physics are ((general theory of physics)).

2. The laws of Acceleration

As well as in the figure 1, 2, 3

1- system $\acute{O}$: particle is moving by Accelerated motion where:

m: The movement mass in the case of very high speed.

$\vec{\acute{a}}$: The acceleration in the case of motion and high speed

$\acute{t}$: Time interval of the accelerating ($\acute{O}$ system).

$\vec{\acute{V}}$: Speed of the accelerated ($\acute{O}$ system).

2- Reference (O System) : Is a system of rest reference In relation to the $\acute{O}$ system where:

m_0: Mass of particle in rest state.

$\vec{a_0}$: The Primary acceleration (the acceleration at moment of take-off). **:**

t: The time interval for the reference (O System) .

$\vec{a}$: Acceleration of inertia, which the particle is affected with it as seen by the observer in reference (O System).

In the case of the accelerated movement at high speed higher than 10% of the speed of light is:

$\vec{F_0}$ **:** is the Driving force on the particle, m_0 the rest mass of the particle a_0: is the moment of take-off acceleration.

$\vec{F_0} = a_0.m_0$ ..1

$\acute{a}$**:** is the acceleration in the case of high-speed movement, the effected force shall be on the particle is:

$\vec{F} = \acute{a}.m$ ..2

- According on the principle of constant force - Shall be 1 equation and 2 equal:

$\vec{F_0} = \vec{F} = \vec{a_0}.m_0 = \acute{a}.m$

From last equation we note: impossibility the constancy of acceleration with increasing of the speed where: $\acute{a} = \frac{a_0}{K}$) if the principle of constant force was true: $\acute{a} \neq constant$

Names of references and historical experiences, which emphasizes increase of mass (the matter Increase) lead to <u>decrease</u> of the acceleration and force still constant.

$$\frac{1}{K} = \frac{m_0}{m} = \frac{\acute{a}}{a_0} \quad .....3 \qquad k = \frac{1}{\sqrt{1-\frac{v^2}{c^2}}}$$

The k factor related to the speed

We conclude:

1. The acceleration ($\acute{a}$): decreases with increasing speed, if particle arrived at the speed of light, the acceleration let go to zero, and the speed becomes a uniform rectilinear motion.
2. The acceleration of inertia (a) of the particle decreases With increasing of speed at acceleration ($\acute{a}$) of particle, it let go to zero if the particle arrived at the speed of light, and the speed becomes uniform rectilinear motion The relationship between tow accelerations are: $\frac{a}{\acute{a}} = \frac{1}{K}$.
3. The relationship of tow time intervals of system $\acute{O}$ and system **O** is: $\frac{\acute{t}}{t} = \frac{1}{K}$

Relations of accelerations are:

$$\acute{a} = \frac{1}{K} a_0 \qquad \text{And} \qquad a = \frac{1}{K} \acute{a}$$

$$\frac{\acute{a}}{a_0} = \frac{a}{\acute{a}} = \frac{m_0}{m} = \sqrt{1-\frac{v^2}{c^2}} = \frac{1}{K}$$

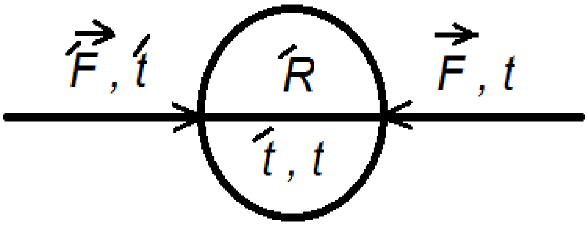

Figure 1

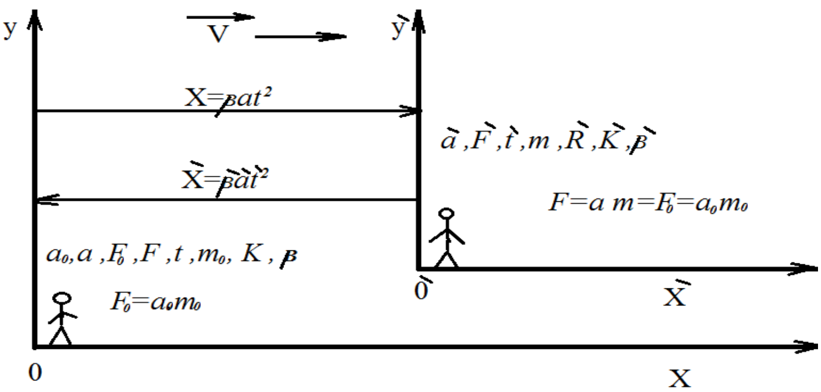

Figure 2

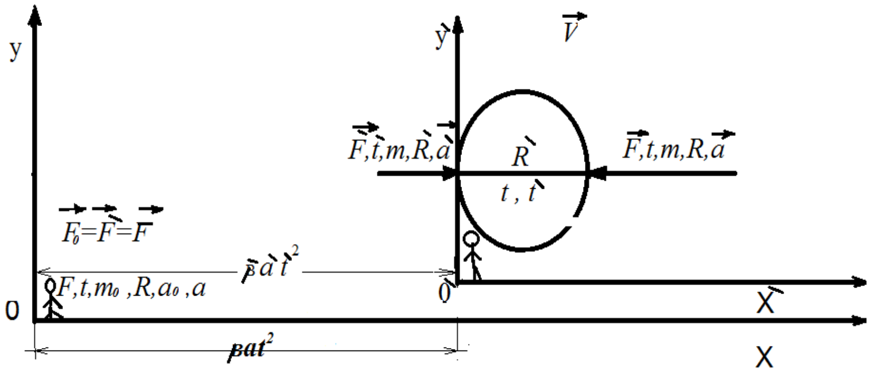

Figure3

3. Equations of Speed

The law of Speed according to classical theory:

$V_{on} = a_0 . t + V_{o1}$. ……… 5

V_{on} **:** The velocity of particle by classical theory.

t**:** Time (time interval) according to classical theory because it is constant and does not changes.

V_{o1} **:** Primary speed, if the movement began from rest the primary speed will be zero $\rightarrow V_{o1} = 0 \rightarrow$

$V_{on} = a_0 . t$ 6

This equation is Incorrect at high speeds to two reasons:

- The interval of time t is Variable: $t \neq costant$.
- The acceleration is Variable: $a \neq costant$.
- The ($\acute{O}$ system**)** observer sees the speed of the particle Relation to the to reference(O system) is:
- $V_0 = \acute{a} . \acute{t}$ Where $\acute{a}$ ، $\acute{t}$ they (acceleration and time interval of ($\acute{O}$ System).
- While observer of ($\acute{O}$ system) sees his speed Relation to the (O system) is:

$V_0 = a . t$ Where a ، t (inertia of the accelerated particle and the time interval for ($\acute{O}$ system).

- There is no difference between the two-speeds: $V_0 = V_0 = V$

This mean is:

$V = a . t = \acute{a} . \acute{t}$ 7

- And dividing (7) Equation on (6) Equation, we find:

$$\frac{V}{V_{on}} = \frac{\acute{a} . \acute{t}}{a_0 . t}$$

But: $\frac{\acute{a}}{a_0} = \frac{\acute{t}}{t} = \frac{m_0}{m} = \frac{1}{K}$ and compensation at 6, we find:

$$\frac{V}{V_{on}} = \frac{1}{K^2}$$

Finally we find:

$$V = \frac{V_{on}}{K^2} \quad \text{... 9}$$

But: $K = \frac{1}{\sqrt{1-\frac{V^2}{C^2}}}$ The compensation in 7 equation we find:

$V = \frac{V_{on}}{K^2} = V_{on}\ (\ 1 - \frac{V^2}{C^2}\ )$ a quadratic equation solved is:

$$\left[V = C\sqrt{1 + \frac{C^2}{4V_{on}{}^2}} - \frac{C^2}{2V_{on}}\right] \quad \text{....... (10.}$$

This equation is the most important equation to calculate the speed when the speed exceeds than 10% of the speed of light.

V_{on}: Calculated of the (6) equation $V_{on} = a_D . t$

Equation (10) is the only equation which calculates the moving speed when the speed exceeds 10% of the speed of light.

When moving speed neglected In relation to the speed of light the equation (8) return to the equations of classical theory to calculate the speed

That:

$$V = V_{on} \rightarrow K^2 = 1 \rightarrow \quad V \ll C \quad : \quad V = \frac{V_{on}}{K^2}$$

<u>Example:</u>

Particle (electron) Subject in a vacuum to the force

$F_D = \acute{F} = 5.4\, X10^{-24}\ N$ For the time $t = 100\ s$

- What is the speed at which the particle arrives during that time?
- Solution: According to classical theory**:**

$$V_{on} = a_D . t$$

$$a_D = \frac{F_D}{m_o} = \frac{5.466x10^{-24}}{9.11x10^{-31}} = 6x10^6 \quad {}^{m}/_{s^2}$$

$$V_{on} = a_D . t = 6x10^6 x10^2$$

$$V_{on} = 6X10^8 \quad {}^{m}/_{s}$$

It is much greater than the speed of light.

- By Einstein:

There are no laws to resolve.

- According to the Jabr's equations :

this speed ($V_{on} = 6X10^8\ {}^{m}/_{s}$) much greater than the speed of light and this is impossible, so we use (Jabr's equations- 10 equation) for speed.

$$V = C\sqrt{1 + \frac{C^2}{4V_{on}^{\ 2}}} - \frac{C^2}{2V_{on}}$$

Compensation, we find:

$V = 2.342329219X10^8\ {}^{m}/_{s}$

4. Equations of Distances

The Classical theory had been finding a law to calculate the distances are:

$$\boldsymbol{X = \frac{1}{2} a . t^2} \quad \dots 11$$

The Classical theory had been finding 1/2 when they considered that the absolute (time and place), and the speed of moving can be released without limits.

But these absolutes are not suitable if the moving speed exceeds more than 10% of the speed of light.

So if the speed of moving exceeds more than10% of the speed of light, I propose the following **(postulate) :**

$$\boldsymbol{X = \beta . a . t^2} \quad \dots (12$$

(β) Is a variable factor is change with the moving speed it is related to speed:

$$\beta = \frac{k}{1+k} \dots\dots (13 \quad \text{and} \quad K = \frac{1}{\sqrt{1-\frac{V^2}{C^2}}}$$

1. Observer at $\acute{O}$ system measures the distance traveled Relation to the O system is:

$$X_{\acute{O}} = \beta_{\acute{O}} . \acute{a} . t^2 \dots\dots (14$$

2. Observer at $\acute{O}$ system measures the traveled distance Relation to the O system is:

$$X_O = \beta_O . a . t^2 \dots\dots (15$$

$\beta_{\acute{O}} = \beta_O$ Because $V_{\acute{O}} = V_O = V$

And dividing the 14 equation on 15 equation, we find:

$$\frac{X_{\acute{O}}}{X_O} = \frac{\beta_{\acute{O}} . \acute{a} . t^2}{\beta_O . a . t^2} \rightarrow \frac{X_{\acute{O}}}{X_O} = \frac{\acute{a} . t^2}{a . t^2} = \frac{\acute{a}}{a . t . t} \frac{t}{} \frac{t}{} = \frac{V_{\acute{O}} . t}{V_O . t} = \frac{t}{t} = \frac{1}{K} = \sqrt{1 - \frac{V^2}{C^2}}$$

$$X_{\acute{O}} = \frac{X_O}{K} \quad \dots 16$$

Observer at $\acute{O}$ system measures the distance traveled Relation to the O system by classical is:

$X = \frac{1}{2} a_0 . t^2$ ..17

It is wrong because it is considered that both (t and a_0) are constant.

5. The Kinetic Energy:

The observer in $\acute{O}$ expresses the kinetic energy by following equation:

$E_{\acute{0}} = \acute{F}.X_{\acute{0}} = m.\acute{a}.\beta.\acute{a}.\acute{t}^2 = m.\beta\acute{a}^2\acute{t}^2 = \beta m V_{\acute{0}}^{\ 2}$ …… 18

$E_{\acute{0}} = \beta m V_{\acute{0}}^{\ 2}$ …… 19

The observer in O expresses the kinetic energy by following equation:

$E_0 = -F.X_0 = -a.m.\beta.a.t^2 = -\beta.m..a^2.t^2 = -\beta m V_0^{\ 2}$ …..20

$E_0 = -\beta m V_0^{\ 2} = |\beta m V_0^{\ 2}|$

$E_0 = \beta m V_0^{\ 2}$

$V_0 = V_{\acute{0}} = a.t = \acute{a}.\acute{t}$

O Observer sees that his system is losing energy which equal energy which $\acute{O}$ win it:

$E_{\acute{0}} = -E_0$ ……. 21

While classicalism observer in O finds that:

$E = F_0 . X = m_o a_0 \frac{1}{2} a_0 t^2 = \frac{1}{2} m_o V_{on}^{\ 2}$

$E = \frac{1}{2} m_o V_{on}^{\ 2}$ …. 22

It is absolutely incorrect because observers in (O and $\acute{O}$) Do not agree with Newton's observer in the estimation of energy.

6. Conclusion:

Previous theories (classical theory and Einstein) did not give the equations of accelerated motion at very high speeds, but now we are able to find the equations of accelerating motion when the speed exceeds more than10% C of the speed of light, it Came from in-depth study hoping to be toward of unifying physics in one theory, My purpose with you in IISTE and all the people to facilitate the physics for students in all over the world.

The Table summarizes the results as the following:

The equations	equations of classical theory in Accelerated motion only in low speeds less than 10%C	Jabr's equations At all low speeds and very high speeds to accelerated motion less and highest than 10%C	
$K = \frac{1}{\sqrt{1 - \frac{V^2}{C^2}}}$	1	$K = \frac{1}{\sqrt{1 - \frac{V^2}{C^2}}}$	
$\beta = \frac{k}{1+k}$	$\frac{1}{2}$	$\beta = \frac{k}{1+k}$	
Accelerations	$a_o = a = \frac{1}{K} \acute{a} = \text{const}$	$\acute{a} = \frac{1}{K} a_o, a = \frac{1}{K} \acute{a}$	variant
Speeds	$V_{on} = a_0 . t$	$V = a.t = \acute{a}.\acute{t}$ $V = C\sqrt{1 + \frac{C^2}{4V_{on}^{\ 2}}} - \frac{C^2}{2V_{on}}$	equal
Distances	$X = \beta . a . t^2$, $X = \frac{1}{2} . a . t^2$	$X_{\acute{0}} = \beta_{\acute{0}} . \acute{a} . \acute{t}^2$ $X_0 = \beta_0 . a . t^2$ $X_{\acute{0}} = \frac{X_0}{K}$	variant
Kinetic energy	$E = \beta m_o V_{on}^{\ 2}$. $E = \frac{1}{2} m_o V_{on}^{\ 2}$	$E_{\acute{0}} = \beta m V_{\acute{0}}^{\ 2}$ $E_0 = \beta m V_0^{\ 2}$	equal

New equations of accelerated movement at very high speeds are:

1- The Equations of Accelerations :

$\acute{a} = \frac{1}{K} a_0$ And $a = \frac{1}{K} \acute{a}$, $\frac{1}{K} = \sqrt{1 - \frac{V^2}{C^2}}$

2- The Equations of Speed :

$V = \acute{a}.t = a.t$, $V = C\sqrt{1 + \frac{C^2}{4V_{DT}{}^2}} - \frac{C^2}{2V_{DT}}$

3- The Equations of Distances :

$X_0 = \beta_0.\acute{a}.t^2$, $X_0 = \beta_0.a.t^2$, $X_0 = \frac{X_0}{K}$

4- The Equations of Kinetic Energy**:**

$E_0 = \beta m V_0{}^2$, $E_0 = -\beta m V_0{}^2 = |\beta m V_0{}^2|$

$E_0 = E_0 = \beta m V_0{}^2$

References:

- Modern physics for universities:
James .A.retcrds
Fransis Weston sers
M.rsl Webr
Marck W.Zemnske

- From Newton to the relative:
Bol coderec

Experiments about increasing of the mass:

1. Kaufmann experience in - 1906
2. Experiment Bohariraam of - 1908
3. Neiman experience in - 1914
4. Photographs of the paths of electrons that can be obtained in a Wilson room:

A. Flexible collision two Perpendicular electrons in a Wilson room after the shock (equal mass).

B. Cosmic rays arriving to the equator possesses speed as if it fired under voltage, over / 20 / V billion up to the mass / 40000 / times greater than the mass is in rest status.

5. Large electron velocity collision with a small electron velocity be formed tow not perpendicular path, but pose an acute angle (unequal mass).
6. A phenomenon Compton.
7. Cathode ray - electrician effort 100000 V - speed of 165,000 km / s increasing its mass by 15% of the mass of static.
8. Nakn's Experiment voltage of 200,000 volts and speed up 210,000 km / s increases by 40% mass of the rest mass.

When radium turns by radioactivity released electrons (rays β) at speeds of 297,000 km / s fits several million