Online ISSN : 2249-4626
Print ISSN : 0975-5896
DOI : 10.17406/GJSFR

Global Journal of Science Frontier Research: A

Physics and Space Science

The Space Theory

Novel Numerical Modelling

Highlights

Analysis of Solar Energy Project

Prediction of Asphaltenes Deposition

Discovering Thoughts, Inventing Future

VOLUME 19 ISSUE 4 VERSION 1.0

Global Journal of Science Frontier Research: A
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Volume 19 Issue 4 (Ver. 1.0)

Open Association of Research Society

Incorporation No.: 0423089
License No.: 42125/022010/1186
Registration No.: 430374
Import-Export Code: 1109007027
Employer Identification Number (EIN):
USA Tax ID: 98-0673427

Global Journals Inc.

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Sponsors: Open Association of Research Society
Open Scientific Standards

Publisher's Headquarters office

Global Journals® Headquarters
945th Concord Streets,
Framingham Massachusetts Pin: 01701,
United States of America
USA Toll Free: +001-888-839-7392
USA Toll Free Fax: +001-888-839-7392

Offset Typesetting

Global Journals Incorporated
2nd, Lansdowne, Lansdowne Rd., Croydon-Surrey,
Pin: CR9 2ER, United Kingdom

Packaging & Continental Dispatching

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Pricing (Excluding Air Parcel Charges):

Yearly Subscription (Personal & Institutional)
250 USD (B/W) & 350 USD (Color)

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Global Journal of Science Frontier Research

Contents of the Issue

Global Journal of Science Frontier Research: A
Physics and Space Science
Volume 19 Issue 4 Version 1.0 Year 2019
Type : Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4626 & Print ISSN: 0975-5896

THE SPACE THEORY

By Prince Jessii
Trasker Institute of Scientific Research

Abstract- After many years and decades, the missing piece is brought to humanity by this time[*from prince jessii*] in preparation for the beginning of a new era starting from *2020* which is the start of another decade. It is released to enable the world to take the correct shape of living in opposition to the other style which is not according to the blueprints, and to begin a new era of physics involving the impossible. The missing piece is "*The space theory*", which will reveal man's universe with regards to its environment.

Keywords: dark energy; dark matter; energy; matter; space; dimension; universe.

GJSFR-A Classification: FOR Code: 020199

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I. Introduction

Space theory is written to avoid high technical soundness to enable readers from other fields to understand better.

This paper follows a sequence. Therefore readers/audience are expected to read paper reference*[1]* and *[2]* on the list before proceeding to this theory. Also, readers/audience are expected to read through this paper *[space theory]* from front to back, and then vice versa [the other way]. After reading "The space theory", the mind of readers/audience should hold onto the release of reference *[7].*

Once "*The space theory*" is published at *Global Journal of Science Frontier Research*, readers/audience are required to circulate the paper around the globe to rapidly reach the individuals who haven't read it.

A Brief guide to reading

In this paper, information are to be presented in a series of headings, secrets are revealed, there are also equations and calculations with diagrams attached to some of these headings. In this paper, the headings are as follows;

1 The Blueprints Frame
2 Dark Energy- The Light of God
3 Space – Man's Environment
4 Energy and Matter
5 Dark Matter- The Breath of Life
6 Physics of a Star and Death Star
7 The Planetary Bodies
8 Dimensions P and S
9 Numbers 137 and 100
10 The Light Universe
11 The Game of 137
12 Physics of the Impossible
13 Conclusions
14 A Trivia Answer

a) *The Blueprint's Frame*

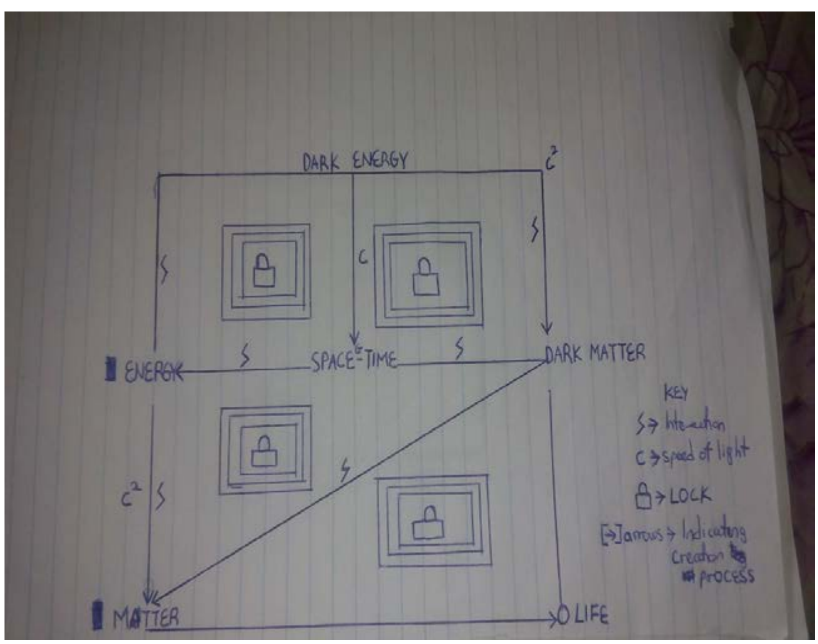

Figure I

Figure I: Represent the frame of the blueprint of man's universe. The frame shows the two energies used in creation which was used to form the corresponding matter related to their dimension, all happening in and through space.

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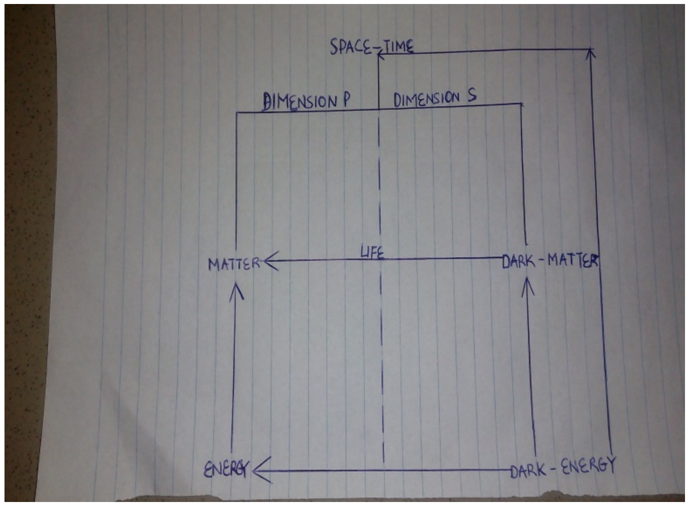

Figure II

Figure II: Shows the difference and relationship between the twodimensions in man's universe and what exists in each of them

b) Dark Energy - The Light of God

This energy has been given a name already, and its name relates to the fact that it cannot be seen. Dark energy which belongs to dimension *S* is the reason why it's hard to see and detect. But generally, dark energy was the first substance used in the creation of man's universe. It can also be referred to the light of our creator [*God*]. Dark Energy *[the first]* was used to create man's environment *[space]* and was used to form its fellow energy on the other dimension *[P]* out from space. In this paper, dark energy is denoted as E_d, and I present its subject equation as $E_d = S \times c$.

Where *S* is the magnitude of space fabric

$$S = 1.50 \times 10^{10}$$

C is the speed of light $c = 3x10^8$

Multiplying these two constants, we have our dark energy constant as $E_d = [4.5 \times 10^{18}]$. Dark Energy exists with space, space is everywhere, and this means that dark energy is everywhere.

c) SPACE – Man's Environment

From paper reference*[1],* space is known to have its strongest and original form as a fabric nature which has a value of 1.50×10^{10}, this fabric nature is the second substance in creation and it was produced from dark energy in other to hold the earth and other planetary bodies which have very big mass with the aim of restricting certain movements from the planets. On the other hand, there was a plan to allow most of these planets to harbor matter with life, and these matter of very low mass compare to the planets [very big mass] cannot survive and interact well with another matter on an environment of space fabric, again these planets which can harbor living things are to be covered with land more or less *50%* of it, space fabric can hold the land at the core of the planet, but it's a problem for living things. Having the humans in mind, our creator decided to involve gravity as the Alta-ego of space fabric which will be in opposition to it

i. *Gravity*

This is the Alta-ego of space fabric; its aim is to reduce the magnitude of space fabric that was supposed to be in a planet. The moment a planet was formed in creation, it will be distorting space fabric which will make gravity to arise and reduce the magnitude of space fabric inside the planet uniformly to a certain level depending on the mass and area of the planet, at the same time to also leave space fabric at the core/center to hold the land. More details are in paper reference*[1]*. This gravity is represented as the gravitational constant *G*, since it is the Alta-ego of space, we have our *G* to be 1/S which is $1/1.50 \times 10^{10} = 6.67 \times 10^{-11}$. This explains why gravity is weak, it's purpose is regarding space. On the outer space, planetary bodies of mass moves on space fabric while distorting it, thereby bringing about gravitational waves which arises from space fabric regaining its shape. As a result of gravity, inside the planet is the reduced magnitude of space fabricی,which brings about objects accelerating according to the nature of space, the reduced magnitude of space fabric pushes objects accelerating due to free fall to the center/core of the planet where the main space fabric is. This acceleration is denoted as g which is acceleration due to gravity. The relationship between what happens outside and inside an enclosure [planet, universe] as regards to space and gravity is given as;

SG=یg [the L.H.S of the equation approving relativity and R.H.S approving quantum mechanics]

Using earth, we have *g= SG/ی*, which is $1.50 \times 10^{10} \times 6.67 \times 10^{-11}/0.10194 = 9.81$, where ی is the reduced magnitude of space fabric for earth, *[readreference 1].*Getting gravity from this reduced magnitude of space fabric involves channeling the slightest piece of quantum space[reduced space] to get quantum gravity. Furthermore, all these means that, on an area of space fabric, if the distance from one point to another increases, it increases because of the expansion of space fabric which involves it deviating from 1.50×10^{10} caused by the external action of gravity resulting from the increase in mass of that particular enclosure carrying the space fabric. Furthermore, the shape of an enclosure[say earth] if not looking from the outer space can be determined by detecting the presence of space fabric at its core/center, and then trace to get its shape. This means that gravity acts uniformly on the space fabric in a planet while taking its shape to reduce it, leaving the space fabric at its core/center with the exact shape of the planet.

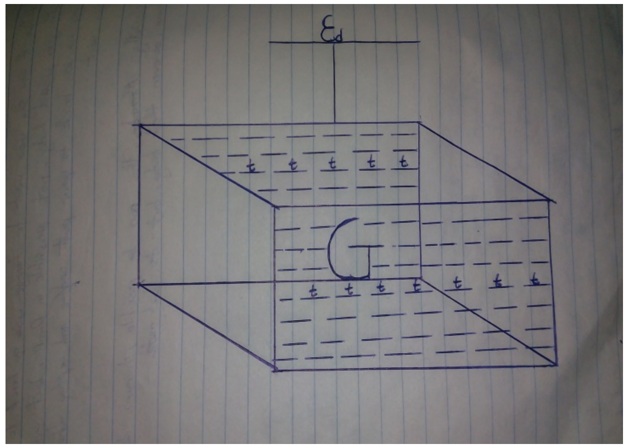

Figure III

Figure III: Shows the structure of space fabric

ii. *Time*

Space and time are part of the same continuum to give space-time. The higher the magnitude of space the slower time required or involved. However, when a velocity moves through space-time, the time is given as $t_R=$ ى /v.

When different velocities are inserted in the equation, it brings about differences in time between the two velocities; this is the reason why two objects in motion will disagree with regards to time. *[Read reference 2]*

d) Energy and Matter

In creation, energy was formed from space by dark energy; it is the third substance in creation. A certain amount of energy was created out of space and this energy was used to form different kinds of matter that makes up man's universe. Dark energy was now used to manipulate this energy to different kinds of matter say plants, planets, air, water etc. Besides dark energy being used by our creator to manipulate this energy to whatever he wants, this energy was cooled to form matter, the amount of energy manipulated will determine the mass of the particular matter and other properties. However, this means that all matter are made from that energy used in creation. Because this energy in creation was manipulated to form different kinds of matter, these different kinds of matter tend to exhibit different forms of energy [sound, electrical, mechanical, negative etc.] by their interaction, but all these energies are all from that same source in creation.

Generally, mass can be used to defined a matter, energy of a matter is now related to its mass as "$E=+mc^2$" where E is the energy of matter, m is the mass of matter; c is the speed of light."$E=mc^2$" is also the relationship between the energy used in creation and the corresponding matter made from it, where E represent the energy used in creation, m is the mass of matter, c is the speed of light. The equation $E= mc^2$ was used for each matter that was made at the creation [manipulated by dark energy] of man's universe.

NB: Space which is man's environment exists from its higher state [fabric] to its quantum state[reduced]. Therefore everything in the environment [space] exists from its higher state to its quantum state [lower].

e) Dark Matter – The Breath of Life

In this paper, dark matter will be denoted as M_d. Similarly, just as Matter is related to Energy in Dimension *P*, Dark Energy in Dimension *S* is related to Dark Matter as $E_d= M_d x c^2$.
Where, E_d is Dark Energy $E_d= 4.5 \times 10^{18}$
C is the speed of light $c= 3x10^8$
$M_d= E_d/c^2$, putting the values in the equation, we have $M_d=[50]$. I present dark matter constant as*[50].*

Dark energy can be used to give life, but it was needed to be cooled to dark matter to be as a permanent attachment to matter to give it life. Using a matter with life [humans] as an example, humans consist of body, spirit and soul. Just as the body is used to differentiate one human from another in dimension *P*, the soul is an ID attached to the spirit which is used to differentiate a personality from another in dimension *S*. On the other hand, the spirit is just a constant which carries its*ID*[soul],it is the breath of life*[50],*if removed from a matter with life, the matter becomes lifeless.

f) Physics of A Star and Death Star

The different matter on man's universe were formed from a certain amount of energy during creation, manipulating the energy to form matter of desired choice makes the matter[manipulated energy] to exhibit new forms of energy. But energy is one and from that only source that was formed in creation. Now the stars are matter still carrying that original energy used in creation. Using man's closest star[Sun], the sun is the source of energy for its solar system, the sun was a planet just like the others, but our creator wanted some planets to stand out as the source of light and energy to other planets, because of this, some planets [stars] were made to transform to the energy that was used to create them rather than just cooling to form itself. This results into the planets imitating the energy by its electrons [matter] absorbing all the photons [energy] that was used to create them to give man its different stars.

However, the energy of the sun is given by $E_{sun} = E \times m$ or$E_{Sun} = E \ / \ 1/m$, this is because the matter as its mass changes into the energy used in creating it. E in the equation can be gotten from mc^2, where m is its mass and c is the speed of light.

Generally the energy of a star is given as $E_{star} = (m_{star} \times c)^2$

Using the mass of a star [sun] which is $1.99 \times 10^{30} kg$,

We have the energy of the sun to be $3.56 \times 10^{77} J$.

When the processes doesn't go the right way, most initial electrons may be found not to be imitating the energy by absorbing the photons, there by influencing some other electrons to refuse absorbing the photons, after some time, majority of these electrons stops to absorb photons, this results into the death of a star. Because it's only dark energy that can manipulate the released energy back to the planet, the star is left with no option than to die, thereby creating a black hole through space fabric. The black hole is a hole of gravitational pull arising from a torn or ripped space fabric dragging anything close by towards it, when a matter enters a black hole; it is held in space fabric with nowhere to go, unless it falls through a corresponding black hole away from the previous. This energy [black hole] on a space fabric goes back to how it was created, i.e. going back to space, remember energy was created out of space. However, this energy resting on space fabric, after sometime, space repairs itself by the presence of dark energy which created it, thereby making the black hole to disappear completely after some period. Massive black holes are due to massive energy and mass from the particular star that died.

Furthermore, just as black holes involve space fabric, massive energy with mass, wormholes involve reduced space fabric, energy of a smallest possible quantum state channeling a reduced space fabric creating a hole through it.

g) Planetary Bodies

The planets were created as substitutes for harboring living things and also for man to have an external enclosure handy. The other planets are the siblings to earth, earth is special because it was chosen to harbor living things at the creation, for its siblings to be like her, they have to be transformed exactly how earth was transformed, from adhering to the rule of the light from the blueprints, to the forming of the first element *[water]* at both the atmosphere and the ground to form a cycle, to planting vegetation.

h) Dimensions P and S– [PS]

Man's universe is made up of two dimensions. At the creation of man's universe, dimension *S* was created first before dimension *P*. Once dimension *P* was created, these two dimensions were merged together with dimension *S* being the heart of *P*, dimension *P* was made to end or fade and *S* which was superior existed first and will always remain. With the two dimensions merged, man was operating from both dimensions as it was created. Practically; man was tested with two options at the creation. Man unknowingly chose to operate from dimension *P*, thereby leaving *S* which is its heart behind to not be seen by man. However, dimension *P* encloses dimension *S* as it stands. As illustrated at the beginning of this paper, dimension *S* consists of *Dark Energy* and *Dark Matter* with *Space* while dimension *P* consists of the *Normal Energy* and *Matter* with *Space*. Thus, Dimension *P* is the dimension visible to man.

Furthermore, dark energy and dark matter are constants because dimension *S* does not fade or change; on the other hand, energy and matter cannot be constants because Dimension *P* fades away.

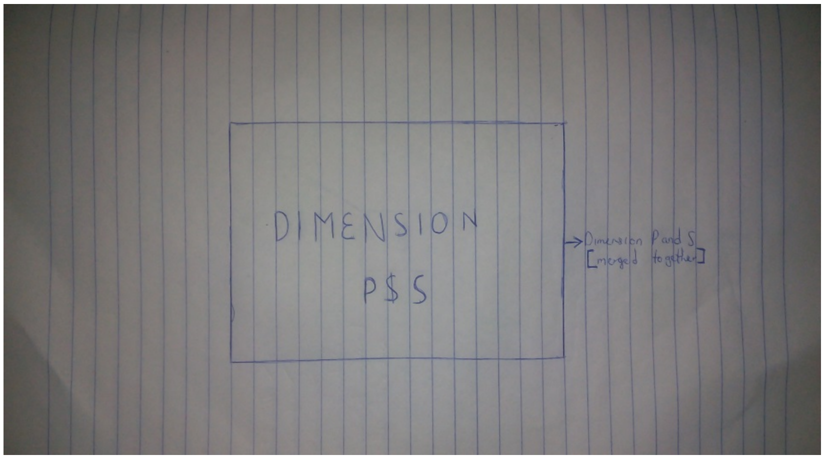

Figure IV

Figure IV: Shows the two dimensions merged together *[PS]* at creation

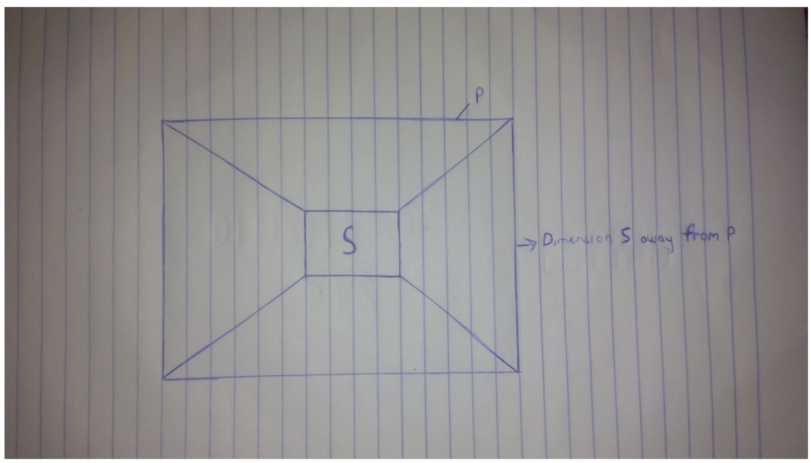

Figure V

Figure V: Shows how man's universe stands. Dimension *PS* is unmerged with dimension *S* far away from dimension *P*

NB: Both dimensions are still connected, but not merged.

i. *Option 1 & 2*

Dimension *S* existed before the creation of the man's universe, it is the superior. Our creator decided to invent a new dimension *[P]* with a different environment and merge it with dimension *[S]* to give dimension *PS*, as a result of merging with the superior, dimension *P* won't be able to fade and both dimensions can exist happily forever. However, man was created after the two dimensions were already merged; man was then tested with two options. The first option is regarding dimension *PS*, ifman chooses the first option, he automatically becomes the light of the superior dimension, thereby making his matter to merge with his dark matter, this would make man to be superior [he cannot fade]. On the other hand, the second option was regarding dimension *P*, if man chooses this option, dimension *PS* will unmerge resulting into dimension *P* being able to fade/end. Man choosing the second option is more like a child looking for a light switch and ended up pressing an alarm switch. To summarize the information about the two options, it says man can either choose to be like the merged dimension *[PS]* or man can choose to make the merged dimension like him.

i) The Light Universe

The blueprints read man's universe as the light universe. Man's universe is all about the light *[energy]*, the two lights representing the two dimensions, one is the dark energy in dimension *S* and the other is the normal physical energy used in creation in which the stars have in dimension *P*. The light universe was formed under the rule that says a matter in any of the dimensions must self-absorb its energy [regarding the particular dimension] used in creating it, and to imitate it, all of its electrons must absorb corresponding photons of the energy. However, it can only imitate the energy[light] only if all its electrons are absorbing photons, but when some of the electrons are absorbing and some are not, it changes the matter by giving it new

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unique properties but not as unique as when all of the electrons are absorbing.

Generally, matter in dimension *S[dark matter]* cannot self-absorb the light*[energy]* in dimension *P*; also matter in dimension *P* cannot self-absorb the light*[dark energy]* in dimension *S*.

However, our creator wanted humans which are made of matter to self-absorb his light in dimension *S* which is *Dark energy* on their own, this is why he gave the breath of life*[50]* to them for human electrons to absorb his light and imitate it.

j) Numbers 137 and 100

137 is a code hidden in creation of man's universe, telling us the secret about it. It says *1* and *3* out of 7, meaning the first day and the third day out of seven days in creation. On the first day of creation, one of the lights *[Dark Energy]*was introduced and on the third day, the other light *[energy]* was introduced before the electrons in the stars where absorbing to be the light themselves. With dark energy representing *[1]* and energy representing *[3]*, the light universe is all about *137*, everything *[matter]* in the light universe was created either from the first light *[1]* or the second light *[3]*, with the lights representing dimension *S* and dimension *P* respectively. Although everything *[matter]* in the light universe was created from either of the lights, the matter was also created to choose to just absorb or become the lights representing its dimension. Each of these lights display photons, when a matter absorbs photons from each of these lights on a *100%* scale; it becomes the light itself and starts displaying photons. However, the equation that describes man's universe goes as follows; as both dimensions were separated, matter is for dimension *P* and it's not meant to exist in dimension S. On the other hand, dark-matter is for dimension *S* and it's not meant to exist in dimension *P.* There's a loop-hole which is the fact that dark-matter is found to exist in dimension *P* because that's the source of life for man in particular. So, we have to use man [matter] which is the bridge connecting both dimensions to get what we want [Explaining the light universe]. Let's take a detail from man, man is matter and a constant that describes matter is the electron.

So we have to equate the process of absorption of one of the lights *[energy]* to the process of absorption of the other light *[dark-energy]* by matter [electron].

The tendency of an electron*[matter]* to absorb a photon from the light*[energy]* in dimension *P* is given as the fine structure constant which is *ke/hc.*

Where

$e = 1.60 \times 10^{-19}$ *[elementary charge]*

$K = 9 \times 10^{9}$ *[coulomb constant]*

$h = 6.63 \times 10^{-16}$ *[reduced planck constant]*

$C = 3 \times 10^{8}$ *[speed of light]*

Although physicists are aware of these constants, to explain these fundamental constants to readers outside the physics or scientific environment in a simple way.

The elementary charge *e* is simply a fundamental constant that describes the electron which is present in all matter, even in your bodies. Besides the electron being many, it just describes the charge carried by just a single electron as *-1e,* which is measured to be approximately $1.60 \times 10^{-19}C$ and it goes with *k* which simply describes the medium of the electron carrying the electric charge in space. However *h* describes the energy[light] that comes from the sun [stars] in small [quantum] forms as related to its frequency, it is also a fundamental constant. As we know, *c* is the speed of light, the highest speed any form of matter can travel; it also describes the motion of light and how fast it moves. So, the fine structure constant simply says, the tendency of that electron in your body*[generally in matter]*to absorb that light from the sun [stars] in small forms which has a speed, all these in space is given as *ke/hc.*

Generally, putting these values, the fine structure constant is calculated as $[9 \times 10^{9}] \times [1.60 \times 10^{-19}]/[6.63 \times 10^{-16}] \times [3 \times 10^{8}]$, then we have *0.0072*, fine structure constant which is the tendency of an electron to absorb a photon in dimension *P* is given as *0.0072*i.e.$\alpha = 0.0072$.

On the other hand, I give you the tendency of matter [*electron*] to absorb a photon from the light*[dark-energy]* as regards to dimension S as $\alpha = E_d \times e$ or $M_d \times c^2 \times e$. Our light in this case is our dark energy; we still have our electron which is going to absorb the light by the presence of dark matter. Remember, we are using man as the loop-hole.

Where

$E_d = 4.5 \times 10^{18}$*[Dark Energy]*

$e = 1.60 \times 10^{-19}$*[elementary charge]*

$C = 3 \times 10^{8}$ *[speed of light]*

$M_d = 50$*[Dark Matter]*

Putting these values in $\alpha = E_d \times e$, we have $[4.5 \times 10^{18}] \times [1.60 \times 10^{-19}]$, to get *0.72*, the tendency of a matter[electron] to absorb the light [energy] in dimension *S* is given as *0.72* i.e.$\alpha = 0.72$.

Hence, we can denote both of the fine structure constants as α_p and α_s as related to their dimension to give; $\alpha_p = 0.0072$ and $\alpha_s = 0.72$.

To simplify, matter is made up of electrons, these electrons are the quantum state of matter, which means matter in its smallest form.

The light *[energy/dark-energy]* is made up of photons; these photons are the quantum state of the light, which means light in its smallest form.

Now, for the quantum state, an electron absorbs the light to become the light itself. Matter is made up of many electrons, if all these electrons are absorbing photons; it changes the matter into the light itself, this is the higher state. Furthermore, as regards to the absorbing/displaying aspect of the fine structure constant. If an electron absorbs/display the light, it contributes to the visibility of the dimension in which the light belongs, i.e. if an electron becomes dark energy, it contributes to the visibility of dimension *S* and if an electron becomes energy, it contributes to the visibility of dimension *P*. Resulting into a constant as;

The visibility constant (κ) *which ranges from* κ_{min} *to* κ_{max} [*1.388 to 138.8]: It describes the general visibility of a dimension existing in the light universe as regards to man[matter], which is given as the inverse of the tendency of an electron to absorb/display a photon [1/α]. When a photon is absorbed/displayed by an electron, it automatically adds to the visibility of a dimension in general.* The visibility constant took effect at the point of the unmerging of dimension *PS,* which resulted into dimension *P* representing κ_{max} as κ_p and dimension *S* representing κ_{min} as κ_s. *The point where these two dimensions have the same visibility value will result into the merging of both dimensions.*

NB: This is just the theoretical aspect, in the nearest future; there'll be a mechanism involving a photon which will consequently measure the current visibility stage for each of the dimensions using the scale [κ_{min} *to* κ_{max}*].*

NB: To make it clear, this visibility which ranges from 1.388-138.8 is not how visible the day is or how dark the night is. It is beyond that, it is the point at which a dimension becomes invisible [1.388] to the point at which it becomes visible [138.8], to matter.

Taking the differences between these two dimensions, we have *138.8- 1.388* i.e. κ_p-κ_s, the differences between the two dimensions is approximately *137* which is the code hidden in the creation of the light universe involving the complete absorption of light by a matter in each dimension.

Furthermore, dividing the two dimensions together, we have *138.8/1.388* i.e. κ_p/κ_s which is *100[the current value of the light universe]*

The equation that defines man's universe is given as $\kappa_s+137=\kappa_p$ and $\kappa_p/\kappa_s=100$ which is further expressed in three major forms, but these three forms are all one.

They are $$1/E_d \times e + 137 = hc/ke \quad \text{...........(1)}$$

e= 1.60 x 10^{-19} [elementary charge]

$$1/M_d \times c^2 \times e + 137 = hc/ke \quad \text{........... (2)}$$

E_d= 4.5 x 10^{18} [Dark Energy]

$$1/S \times c \times e + 137 = hc/ke \quad \text{...............(3)}$$

K= 9x10^9 [coloumb constant]

and S = 1.50 x 10^{10}[Space]

$$E_d ehc/ke = 100 \quad \text{.....................(4)}$$

$$Sehc^2/ke = 100 \quad \text{.....................(5)}$$

h= 6.63 x 10^{-16} [planck constant]

$$M_d ehc^3/ke = 100 \quad \text{.....................(6)}$$

C= 3 x 10^8 [speed of light]

M_d= 50 [Dark matter]

As we can see, the left hand side of the equations *[1,2,3]* is for dimension *S* and the right hand side is for *P*, using *137*as the "*unifier*". Equations*(1)* and *(4)* describes the absorption of the other light*[dark energy]*, equations*(2)* and *(6)* further explains it by the presence of dark matter, and equations*(3)* and *(5)* shows the absorption process through space. These three equations are all one.

k) The Game of 137

Flashback at the moment our creator decided to create the light universe with dimension *P* and dimension *S* having the same visibility value of *[1.388]* which approved the merging of both dimensions. Then he started filling the merged dimension *[PS]* with different kinds of matter.

And

Flashback before the creation of man, the stars *[representing dimension P]* were created for its purpose and also to automatically play and complete the game of *137* at the point of its creation. This wasn't obvious and it didn't cause any effect because both dimensions were merged already at that point. Our creator expected man*[representing dimension S]* to choose the first option and automatically play its own game for its coming generations. Unfortunately, man chose the second option which resulted into the unmerging of dimension *PS* making it obvious that the stars have already played their game. This is why dimension *P* is visible to man and *S* isn't, resulting into the equation $\kappa_s + 137=\kappa_p$ which says that "dimension *S* is *137* away from *P*".

137 is the only phenomenon that can unite both dimension *S* and dimension *P* just as in the equation $\kappa_s + 137=\kappa_p$. Besides, to explain the equation further, it says that dimension *S* needs the game of *137* to reach the stage of dimension *P*

To simplify, we can address energy and matter in Dimension *P* as *Normal Energy* and *Normal Matter*

And energy and matter in Dimension *S* as *Dark Energy* and *Dark Matter*

To proceed, there's an absorption by external source and there's self-absorption. Now, matter in each of these dimensions can only self-absorb its energy related to its dimension, for matter to absorb energy related to another dimension, it has to be done by an external source i.e. injecting the energy to its electrons.

Again, our creator was only concerned about man which is matter because unlike other matter with life, he created man with an *ID* [soul] attached to its dark matter. Moreover, he wanted man to self-absorb his light which was not possible, thereby bringing dark matter into the play so man's electrons can self-absorb his light on their own.

The game of *137* is the only chance man has to reverse everything to how it was meant to be at creation, i.e. uniting the two dimensions to be at the same stage. As a result of man being the only matter that has an ID and existing in both dimensions, it has been given the responsibility of uniting both dimensions.

The rule of the game: Man must self-absorb his light *[dark energy]* gradually, and when the absorption reaches *100%,* man becomes the light*[dark energy]* itself. With the stars completing the game of *137* for dimension *P*, the light universe with regards to dimension *S* needs man times the number of stars at the outer space to start and complete this game to perfection. Once this is done, dimension *S* will regain its visibility and both dimensions will be at the same stage and will merge together making dimension *P* not to fade, to unite the light universe. We will now have our complete light universe as $Ꝁ_s=Ꝁ_p$*[138.8=138.8]* and $Ꝁ_p/Ꝁ_s=1$*[the original value of the light universe]*.The key to immortality is in man's hand.

I) Physics of the Impossible

Again, for matter to become the light, it must imitate the light by all its electron absorbing the photons which is *100%*, this makes the matter to be like the stars on the outer space, but I tell you, if just *30%* of its electrons absorbs the corresponding photons, this improves the properties of the matter giving it unique properties from its previous, this will create a whole new level in physics when man starts to test different kinds of matter to absorb the photons[energy]. On the other hand, man is matter and cannot be the mini stars because its body is not meant for that, so man has to concentrate on trying to become the other light*[dark energy],*to become the light, man must imitate the light meaning all man's electrons are absorbing photons*[dark energy],* but I tell you, if just *30-50%* of the electrons are absorbing, this gives man unique properties far different from its original properties, this will create a whole new level in physics involving the impossible.

Let me explain a few impossibilities that turned out to possible

i. *Time Travel*

Man says time travel is not possible, this is simply because man wants to time travel in a dimension where everything ends and fades, man's body changes every second and therefore man cannot go back or front in time expecting to be in your former body which has faded away. But man's dark matter is constant from past down to the future; it doesn't fade. So when experimental studies start in the near future, man will eventually discover how to time travel using its dark matter [on a large scale]which is constant.

ii. *Cancer Cure*

By just a little absorption of dark energy by both an external source and self-absorption process, man's body resets and clears any form of disease in the body permanently. Diseases are not a thing to worry about in dimension *S* because it doesn't exist there. Let's just say dark energy have other things to worry about than diseases.

iii. *Psychokinesis*

Dark energy can be injected into a matter without lifeto give it life for some minutes or seconds, and then it can be controlled for the required time.

To summarize, all things are possible in dimension S but not all are possible in dimension P because it fades. However, man's universe is dimension *P&S*, therefore all things are possible in man's universe. All impossibilities can be achieved if it is according to the blueprints and examining which dimension will be easier or suitable to use. Moreover, it was said in the holy book that all things are possible through our creator.

II. Conclusions

I called it the space theory because all these where encrypted inside man's environment*[space],* all the fundamental values of man's universe answer to space and are gotten from space. Now that man's universe has been explained, a new era of physics involving absorptions of light should begin in order for new properties of both matter in each dimensions to be unleashed. Also, all the deep secrets of the light universe can be revealed with *"Jessii's Blueprints".*

All theories in this paper are novel and originate from paper reference [1]and [2]. The following equations with their theories and constants in this paper are created and proposed by *Prince Jessii;*

$E_d[4.5 \times 10^{18}] = S \times c$

$M_d\ [50] = E_d/c^2$

$S = 1.50 \times 10^{10}$

SG=ﻯg

$E_{star}= (m_{star} \times c)^2$

$E_{star}= E \times m_{star}$

$E_{star}= E /1/m_{star}$

$Ꝁ_p=[138.8]$

$Ꝁ_s=[1.388]$

$Ꝁ_s = 1/ E_d \times e$

$Ꝁ_s = 1/M_d \times c^2$

$Ꝁ_s = 1/ S \times c \times e$

$Ꝁ_{min}=1.388$

$Ꝁ_{max}= 138.8$

$Ꝁ_s + 137 = Ꝁ_p$

$Ꝁ_p/Ꝁ_s = 100$

$Ꝁ_s = Ꝁ_p[138.8 = 138.8]$

$Ꝁ_p/Ꝁ_s = [1]$

$1/E_d \times e + 137 = hc/ke$

$1/M_d \times c^2 \times e + 137 = hc/ke$

$1/S \times c \times e + 137 = hc/ke$

$E_d ehc/ke = 100$

$Sehc^2/ke = 100$

$M_d ehc^3/ke = 100$

$Ꝁ_p = hc/ke$

These are all part of the space equations.

a) A Trivia Answer

Question: Is man doomed?

Prince Jessii: Not yet, the first man had only one chance to choose and instead of choosing to automatically play the game for his coming generations, he pressed the alarm switch. Now the only chance is that each and every one of his generations has to play the game manually [137] to merge the two dimensions back to prevent dimension P from fading.

"Our creator was already prepared by creating a locked option [137] related to the stars, just in case the first man makes a mistake by pressing the alarm switch". That option is what I've just unlocked and explained to the world.

Reminder: Every day, the stars appear at the night sky representing the hint to man's universe, telling man exactly what he should do. On the other hand, without the knowledge, man looks back at the night sky and the only thing he says is "the sky is beautiful".

The bottom line is "man is running out of time". P is already fading gradually.

Question: why are there billions of planets in our universe?

Prince Jessii: just in case man completes the game.

Question: What happens if man doesn't play the game?

Prince Jessii: Its simple, all of dimension P which includes man will completely fade/end one day and the part of man [dark matter] which belongs to dimension S will answer to our creator. He knows what to do to man for failing or passing the game. However, a new dimension P will be created and merged with S permanently, and this time a new man will be created [representing its generation] and will be given only one option, "The Light Switch".

A Brief Message: With all the unfortunate events happening in the light universe: Having all of its blueprints, the light universe requests my attention to come to its rescue immediately. Now I show forth as its guide and handbook from this year [2019] to help fix the world and lead the way to the all-round positive progress of the universe. [Space Equations-----Space Equations: Time Series-----The Space Theory]

Acknowledgment

I'm grateful to God Almighty for guiding me through the blueprints. Cracking it is a task, but it wouldn't have been better if it didn't seem to be in accordance with some of the theories that my fellow scientists/physicists proposed. You all have done a great job. Amongst them, special acknowledgement goes to the greats: *I. Newton*, *A. Einstein*, *M. Planck*, *C. A. Coulomb*, for contributing their ideas to physics during their era, and *M. Kaku* who compiled the present, future, possibilities and the impossible in his unique books.

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Global Journal of Science Frontier Research: A
Physics and Space Science
Volume 19 Issue 4 Version 1.0 Year 2019
Type : Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4626 & Print ISSN: 0975-5896

The Vlasov-Maxwell-Einstein Equations and its Cosmological Applications

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Abstract- The Vlasov-Maxwell-Einstein equations are derived from classical action of Lorentz–Schwarzschild–Hilbert–Einstein. We need and get synchronization of times of different particles. On the basis of obtained results we analyze Einstein's Lambda–term and its connection with dark energy.

Keywords: einstein lambda–term, vlasov–type equation, vlasov–einstein equation, synchronization of times, dark energy.

GJSFR-A Classification: *FOR Code: 020103*

THEVLASOVMAXWELLEINSTEINEQUATIONSANDITSCOSMOLOGICALAPPLICATIONS

Strictly as per the compliance and regulations of:

The Vlasov–Maxwell–Einstein Equations and its Cosmological Applications

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Abstract- The Vlasov-Maxwell-Einstein equations are derived from classical action of Lorentz–Schwarzschild–Hilbert–Einstein. We need and get synchronization of times of different particles. On the basis of obtained results we analyze Einstein's Lambda–term and its connection with dark energy.

Keywords: einstein lambda–term, vlasov–type equation, vlasov–einstein equation, synchronization of times, dark energy.

I. Introduction

Cosmological Lambda–term is now widely used to explain dark energy [1]–[3]. Einstein himself considered the introduction of the Lambda–term the biggest mistake of his life. In this paper we show that in the classical action the contribution of other components is difficult to be distinguished from the Lambda's contribution, so Einsteins' suspicions can be justified. To compare these contributions, we need to rewrite some of them through the distribution functions, as is done in the derivation of the Vlasov equations. We derive the Vlasov–Maxwell–Einstein equation [4]–[5] via classical actions and Maxwell Lagrangian and Poincare–Einstein–Schwarzschild–Hilbert–Pauli Lagrangian.

Vlasov–like equations live an amazing life now. Not only the area of their applications expands all the time, but also new names emerge constantly. There already are the Vlasov–Poisson equations for gravity, plasma and electrons, the Vlasov–Maxwell equations for electrodynamics and the Vlasov–Einstein equations for strongly relativistic gravity. In this paper, we present the Vlasov–Maxwell-Einstein equations. The name choice is natural because it originates from the classical Lagrangians of the General Theory of Relativity (GTR) and electrodynamics [6]–[10]. When deriving Vlasov–like equations from the classical Lagrangians [6]–[9] according to [11]–[18], the Liouville equations are first derived. In the case of the Vlasov–Maxwell–Einstein equations, new difficulties arise. We need to synchronize times of different particles and compare different forms of Lagrangians for their geodesics. The interval integral appears, which is usually assumed to be unity [6]–[10]. It is impossible to synchronize the times without this integral, and therefore write down the Vlasov–Einstein equation for many particles. To obtain the self–consistent field equations, it's required to transform the classical actions from Lagrangian coordinates to Eulerian coordinates using distribution functions.

The work plan is as follows. Firstly, we consider the theory of geodesics with an electromagnetic field for classical Lagrangians. In the second section we consider the connection of two forms of general relativistic actions. In the third section a multiparticle problem leads to time synchronization. We write out the Hamiltonian formulation and write down a Liouville equation. The fourth part is about the application of the Hamiltonian formalism for time-independent fields. The next section is about the integration of the geodesic equations in fields that depend

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Global Journal of Science Frontier Research (A) Volume XIX Issue IV Version I Year 2019

only on time using the Hamiltonian formalism. In the last section we finally derive the Vlasov–Maxwell–Einstein equations.

II. The Equivalence of Two Actions in the General Relativity Theory (GTR)

Let's consider the GTR action in the presence of an electromagnetic field [6]–[10], describing the movement of particles of m mass and e electric charge:

$$S_1 = -mc\int\sqrt{g_{ab}\frac{dx^a}{dq}\frac{dx^b}{dq}} - \frac{e}{c}\int A_a\frac{dx^a}{dq}dq \tag{1}$$

Here $g_{ab}(x)$ is a metric in 4-dimensional space-time $x \in R^4$, and $A_a(x)$ is the potential of an electromagnetic field $(a, b = 0, 1, 2, 3)$. Repeating superscripts and subscripts are summed up here and thereafter. Such an action is inconvenient for the Hamiltonian formalism, since its Hamiltonian is zero by the Euler's homogeneous function theorem. Indeed, the Lagrangian is a linear expression in velocities. The transition to a more convenient action is more or less known in the literature [6]–[9], but wasn't strictly justified, so we will give the proof for it. Take a look at this action

$$S = -\frac{mc}{2\sqrt{I}}\int g_{ab}(x)\frac{dx^a}{dq}\frac{dx^b}{dq}dq - \frac{e}{c}\int A_a\frac{dx^a}{dq}dq \tag{2}$$

The value of $I = g_{ab}\frac{dx^a}{dq}\frac{dx^b}{dq}$ in constant, as we will see later. The connection of (1) and (2) is justified by the following general lemma.

Consider an action with kernel

$$k\int L(x, \frac{dx}{dq})dq + \int L_1(x, \frac{dx}{dq})dq \tag{3}$$

and another action with kernel

$$\int h(L)(x, \frac{dx}{dq})dq + \int L_1(x, \frac{dx}{dq})dq, \tag{4}$$

where $h(L)$ is a some function of L Lagrangian. Let's compare their Euler-Lagrange equations.

The **Lemma** is as follows: If these conditions are true

1. L Lagrangian is an integral of motion for (3) action.
2. k from (3) must be equal to the derivative of $h(L)$ from (4), that is $k = \frac{dh(L)}{dL}$.

Then (3) and (4) are equivalent, which means that their Euler-Lagrange equations are the same.

The proof is to compare the Euler-Lagrange equation for (4) action

$$\frac{d^2h}{dL^2}\frac{dL}{dq}\frac{\partial L}{\partial v} + \frac{dh}{dL}\frac{d}{dq}\frac{\partial L}{\partial v} + \frac{d}{dq}\frac{\partial L_1}{\partial v} = \frac{dh}{dL}\frac{\partial L}{\partial x} + \frac{\partial L_1}{\partial x},$$

with the same for (3) action

$$k\frac{d}{dq}\frac{\partial L}{\partial v}+\frac{d}{dq}\frac{\partial L_1}{\partial v}=k\frac{\partial L}{\partial x}+\frac{\partial L_1}{\partial x}.$$

The corollary: the (1) action and the (2) action are equivalent. To see this, we need to set

$$h(L)=-mc\sqrt{L},\quad L=g_{ab}\frac{dx^a}{dq}\frac{dx^b}{dq},\quad L_1=-\frac{e}{c}A_a\frac{dx^a}{dq} \tag{5}$$

The first condition is satisfied by the same Euler's homogeneous function theorem, because the Hamiltonian for (2) action is proportional to the Lagrangian from (5), since L is quadratic in velocities, and L_1 is linear in velocities. The second condition: k from (3) is exactly equal to the derivative of $h(L)$: $k=\frac{dh}{dL}=-\frac{mc}{2\sqrt{L}}$. This coefficient stands before the first term in the (2) action. I denotes a persistent value of L from (5), that is the interval squared. Usually [6]–[9] a natural parameter s is taken instead of arbitrary q. They are connected by a simple formula $ds=\sqrt{I}dq$, which follows from the comparison of ds and I.

Let's write down the Euler–Lagrange equations for (1) and (2) actions. In contrast to the usual derivations [6]–[9], [19], we assume the value of the interval is not a unity, but $\sqrt{I}$.

$$\frac{mc}{\sqrt{I}}\frac{d}{dq}(g_{ab}\frac{dx^b}{dq})+\frac{e}{c}\frac{d}{dq}A_a=\frac{mc}{2\sqrt{I}}\frac{\partial g_{bc}}{\partial x^a}\frac{dx^b}{dq}\frac{dx^c}{dq}+\frac{e}{c}\frac{\partial A_b}{\partial x^a}\frac{dx^b}{dq} \tag{6}$$

From the (6) system, it can be seen that without electromagnetic fields, $\frac{mc}{\sqrt{I}}$ factors are reduced, and the equations do not depend on which parameter is taken, the interval s or the initial q parameter. But if electromagnetic field is present, there will be different equations. A transition to the natural parameter s is possible, which follows from (6). However, this possibility is absent in multiparticle problems, as we will see below.

III. Multiparticle Problem, Time Synchronization, Hamiltonian Formulation and Liouville Equation

Let's consider a multiparticle problem of motion in a gravitational and electromagnetic field. Consider an action similar to (1) for an ensemble of particles.

$$S_1=-\sum_r m_r c\int\sqrt{g_{ab}\frac{dx_r^a}{dq}\frac{dx_r^b}{dq}}dq-\sum_r\frac{e_r}{c}\int A_a\frac{dx_r^a}{dq}dq \tag{7}$$

We can again come to (2)-type Lagrangian and get an equivalent action

$$S=-\sum_r\frac{m_r c}{2\sqrt{I_r}}\int g_{ab}(x)\frac{dx_r^a}{dq}\frac{dx_r^b}{dq}dq-\sum_r\frac{e_r}{c}\int A_a\frac{dx_r^a}{dq}dq \tag{8}$$

It should be noted that here an r index appears which numbers the particles. Values of I_r integral denoting the particles' interval sizes are not necessarily the same. Here we have synchronized the proper time of the particles $ds_r=\sqrt{I_r}dq$ in the following sense: 1) we have showed that the impossibility of synchronizing the ds_r intervals themselves is come from the different values of I_r; 2) we have showed how different proper times are related: the q parameter for all particles is the same. It's important that the I_r integrals depend on parametrization, but their ratio does not, so it's convenient to rewrite the action (8) via the ds interval of some particle (observer).

$$S=-\sum_r \frac{m_r c\sqrt{I}}{2\sqrt{I_r}}\int g_{ab}(x)\frac{dx_r^a}{ds}\frac{dx_r^b}{ds}ds-\sum_r \frac{e_r}{c}\int A_a\frac{dx_r^a}{ds}ds.$$

Using the usual momentum formulae, from (2) or (7) or (8) we get

$$Q_{ra}=\frac{\partial L}{\partial v_r^a}=-\frac{m_r c}{\sqrt{I_r}}g_{ab}(x_r)\frac{dx_r^b}{dq}-\frac{e_r}{c}A_a(x_r) \tag{9}$$

These Q_{ra} are the canonical "long" momenta [6]–[9]. Then the velocities expressed through the long momenta are

$$\frac{dx_r^b}{dq}=-\frac{\sqrt{I_r}}{m_r c}g^{ab}(x_r)(Q_{ra}+\frac{e_r}{c}A_a) \tag{10}$$

$$\begin{aligned}\frac{dQ_{ra}}{dq}=\sum_r \frac{\sqrt{I_r}}{m_r c}(Q_{rd}+\frac{e_r}{c}A_d(x_r))\frac{\partial g^{db}}{\partial x^a}(x_r)(Q_{rb}+\frac{e_r}{c}A_b(x_r))+\\ \frac{e_r\sqrt{I_r}}{m_r c^2}(Q_{rd}+\frac{e_r}{c}A_d(x_r))g^{db}\frac{\partial A_d}{\partial x_r^a}\end{aligned} \tag{11}$$

There is a Hamiltonian for which the equations (10) and (11) are canonical:

$$H=\sum_r \frac{\sqrt{I_r}}{m_r c}(Q_{ra}+\frac{e_r}{c}A_a(x_r))g^{ab}(x_r)(Q_{rb}+\frac{e_r}{c}A_b(x_r))$$

The integrals $\sqrt{I_r}$ do the time synchronization here, leading to differentiation by the same parameter q. Now we write the corresponding Liouville equation for the distribution function $f_r(x,p,q)$.

$$\begin{gathered}\frac{\partial f_r}{\partial q}-\frac{\sqrt{I_r}}{m_r c}g^{ab}(x)(Q_a+\frac{e_r}{c}A_a)\frac{\partial f_r}{\partial x^b}+\\ (\frac{\sqrt{I_r}}{m_r c}(Q_d+\frac{e_r}{c}A_d(x))\frac{\partial g^{db}}{\partial x^a}(Q_b+\frac{e_r}{c}A_b(x))+\\ \frac{e_r\sqrt{I_r}}{m_r c^2}(Q_d+\frac{e_r}{c}A_d(x))g^{db}\frac{\partial A_d}{\partial x^a})\frac{\partial f_r}{\partial Q_a}=0\end{gathered} \tag{12}$$

Here indices r have moved from the momenta and the coordinates to the distribution function $f_r(x,p,q)$ as usual [10]–[18], and the equations depend on the indices only through mass, charges and intervals squared, i.e. I_r.

Let's write out the stationary form of this equation, where $f_r(x,p,q)$ does not depend on q, this is how the Vlasov–Einstein equation is usually written [10], [15], [16].

$$\begin{gathered}-g^{ab}(x)(Q_{rb}+\frac{e_r}{c}A_b)\frac{\partial f_r}{\partial x^a}+\\ (\frac{\partial g^{bd}}{\partial x^a}(Q_{rd}+\frac{e_r}{c}A_d)(Q_{rb}+\frac{e_r}{c}A_b)+\\ \frac{e_r}{c}F_{ab}(x)g^{db}(Q_{rd}+\frac{e_r}{c}A_d))\frac{\partial f_r}{\partial p_a}=0\end{gathered} \tag{13}$$

The integrals I_r and the masses m_r have disappeared, but the electric charges e_r have not. Compare now the resulting equations with those when using "short" momenta in (7) without the electromagnetic field.

$$p_{ra} = -\frac{m_r c}{\sqrt{I_r}} g_{ab}(x_r) v_r^b, \quad v_r^b = \frac{dx_r^b}{dq} \tag{14}$$

We have obtained the first-order equations for the (7) (or (8)). They are non-Hamiltonian, but divergence-free. For the sake of clarity, we will use the proper time of some particle (observer) s, $ds = \sqrt{I}dq$ when synchronizing, instead of the affine parameter q.

$$\begin{gathered} \frac{dx_r^b}{ds} = -\frac{\sqrt{I_r}}{m_r c\sqrt{I}} g^{ab}(x_r) p_{ra}, \\ \frac{d}{ds}(p_{ra}) = -\frac{\sqrt{I_r}}{m_r c\sqrt{I}} \frac{\partial g^{bd}}{\partial x^a} p_{rb} p_{rd} + \frac{e_r}{c} \frac{\sqrt{I_r}}{m_r c\sqrt{I}} F_{ab}(x_r) g^{db}(x_r) p_{rd} \end{gathered} \tag{15}$$

Let's write the Liouville equation for the distribution function $f_r(x, p, s)$ of particles with masses m_r and electric charges e_r over the 4-space x, 4-momentum p with s as a parameter.

$$\begin{gathered} \frac{\partial f_r}{\partial s} - \frac{\sqrt{I_r}}{m_r c\sqrt{I}} g^{ab}(x) p_a \frac{\partial f_r}{\partial x^b} + \\ (-\frac{\sqrt{I_r}}{m_r c\sqrt{I}} \frac{\partial g^{bd}}{\partial x^a} p_b p_d + \frac{e_r}{c} \frac{\sqrt{I_r}}{m_r c\sqrt{I}} F_{ab}(x) g^{db} p_d) \frac{\partial f_r}{\partial p_a} = 0 \end{gathered} \tag{16}$$

The stationary form of this equation, i.e. $f_r(x, p, s)$ does not depend on s:

$$-g^{ab}(x) p_a \frac{\partial f_r}{\partial x^b} + (-\frac{\partial g^{bd}}{\partial x^a} p_b p_d + \frac{e_r}{c} F_{ab}(x) g^{db} p_d) \frac{\partial f_r}{\partial p_a} = 0 \tag{17}$$

So, we have obtained the stationary ((13) or (17)) Liouville equations, also non-stationary ((12) or (16)) ones. We can see that when transforming (12) to (13) or (16) to (17) the integrals $\sqrt{I_r}$ and the masses m_r are being reduced, but the charges e_r are not.

IV. Analysis of Special Cases of Euler–Lagrange Equations

It can be seen from (6) that in the stationary case, when the metric g_{ab} and vector potentials A_a do not depend on the time coordinate $x_0 = ct$, the right-hand side in (6) disappears when $a = 0$, and we can integrate the left side

$$\frac{mc}{\sqrt{I}}(g_{0b}\frac{dx^b}{dq}) + \frac{e}{c} A_0 = -Q_0 \tag{18}$$

a) Landau Metric

To understand what the integral (18) is, let's take the weakly relativistic metric [8, Eq. (87.13)]:

$$g_{ab} = (1 + \frac{2U}{c^2}, -1, -1, -1)$$

Then the integral (18) becomes

$$\frac{mc}{\sqrt{I}}(1+\frac{2U}{c^2})(\frac{dx^0}{dq})+\frac{e}{c}A_0=-Q_0 \tag{19}$$

The remaining equations (6) take the following form

$$\frac{mc}{\sqrt{I}}\frac{d}{dq}(\frac{dx^j}{dq})+\frac{e}{c}\frac{d}{dq}A_j=\frac{mc}{c^2\sqrt{I}}\frac{\partial U}{\partial x^j}(\frac{dx^0}{dq})^2+\frac{e}{c}\frac{\partial A_b}{\partial x^j}\frac{dx^b}{dq}, \quad j=1,2,3. \tag{20}$$

We can exclude q differentiation, replacing it with x^0 or t differentiation, and the equations will acquire a familiar form of dynamics in the electromagnetic field with Lorentz force and electrostatics and gravitational potential U, but the effective mass expression is quite interesting.

$$\frac{d}{dt}(M\frac{dx^j}{dt})=-M\frac{\partial U}{\partial x^j}+\frac{e}{c}F_{bj}\frac{dx^b}{dt} \tag{21}$$

Here F_{ab} are common field expressions by potentials [6]–[18], and the expression for effective mass M is

$$M=-\frac{\frac{Q_0}{c}+\frac{e}{c^2}A_0}{1+\frac{2U}{c^2}} \tag{22}$$

We can see how the effective mass (22) depends on gravitational and electric fields, therefore Q_0 can be considered as zero component of the momentum or energy outside the fields. It should be noted that all calculations are accurate when using the Lagrangian (2). Let's write out the expression for Q_0, replacing q differentiation with t one in (18), also get the final expression for the effective mass.

$$Q_0=-\frac{mc(1+\frac{2U}{c^2})}{\sqrt{1-\frac{v^2}{c^2}+\frac{2U}{c^2}}}-\frac{e}{c}A_0, \quad M=\frac{m}{\sqrt{1-\frac{v^2}{c^2}+\frac{2U}{c^2}}}$$

b) Fock Metric

Let's consider now the Fock metric [7] (weakly relativistic also):

$$g_{ab}=(1+\frac{2U}{c^2},-(1-\frac{2U}{c^2}),-(1-\frac{2U}{c^2}),-(1-\frac{2U}{c^2}))$$

The equation of motion takes a more complex form than (21)

$$\frac{d}{dt}(M\frac{dx^j}{dt})=-M\frac{1+\frac{v^2}{c^2}}{1-\frac{2U}{c^2}}\frac{\partial U}{\partial x^j}+\frac{e}{c}F_{bj}\frac{dx^b}{dt}$$

The Q_0 and M expressions are as follows

$$Q_0=-\frac{mc(1+\frac{2U}{c^2})}{\sqrt{1-\frac{v^2}{c^2}+\frac{2U}{c^2}+\frac{2Uv^2}{c^4}}}-\frac{e}{c}A_0, \quad M=-\frac{(\frac{Q_0}{c}+\frac{e}{c^2}A_0)(1-\frac{2U}{c^2})}{1+\frac{2U}{c^2}}$$

Finally, for the effective mass we get

$$M = \frac{m(1-\frac{2U}{c^2})}{\sqrt{1-\frac{v^2}{c^2}+\frac{2U}{c^2}+\frac{2Uv^2}{c^4}}}.$$

c) Uniform Universe: Solutions that Depend Only on Time

Let the metric and the gravitational and electromagnetic fields depend only on time, which means that the universe in completely uniform. In this case, the (6) equations can be integrated via Hamiltonian mechanics, but it is interesting to look at specific aspects. We have three motion integrals

$$\frac{mc}{\sqrt{I}}(g_{db}\frac{dx^b}{dq}) + \frac{e}{c}A_d = Q_d, \quad d = 1,2,3 \tag{23}$$

We use the integral of "energy" instead of the equation for the zero component, that is the interval squared:

$$I = g_{ab}\frac{dx^a}{dq}\frac{dx^b}{dq}$$

Now we get that all small momenta are determined as time functions from (14) and (23):

$$p_d = \frac{e}{c}A_d - Q_d, \quad d = 1,2,3 \tag{24}$$

The last zero component is determined as a time function from the analogue of the "energy integral", that is the square of the interval for the momenta:

$$g^{ab}p_a p_b = m^2c^2 \tag{25}$$

Here we come to a well-known relation that leads to the Hamilton-Jacobi method [6]–[17]. The equations for determining all coordinates are

$$\frac{dx^a}{dq} = -\frac{\sqrt{I}}{mc}g^{da}(x^0)p_d \tag{26}$$

We can exclude q via dividing the three equations (23) for $d = 1,2,3$ by the equation for $d = 0$.

$$\frac{dx^a}{dx^0} = \frac{g^{da}(x^0)p_d(x^0)}{g^{0d}(x^0)p_d(x^0)} = \frac{g^{da}(x^0)(\frac{e}{c}A_d(x^0) - Q_d)}{g^{0d}(x^0)(\frac{e}{c}A_d(x^0) - Q_d)}, \quad a = 1,2,3 \tag{27}$$

We have obtained equations where terms depend only on time, and these equations can be easy integrated. The solutions are significant generalizations of de Sitter space [17]. Such equations would be appropriate to be applied to the question of dark energy and dark matter [1], [18].

V. Vlasov-Maxwell-Einstein Equations

When deriving the Vlasov-Maxwell-Einstein equations according to [11]–[14], [18], we use the classical action [6]–[10]:

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$$S=-\sum_{r,\lambda}m_rc\int\sqrt{g_{ab}\frac{dx^a_{r,\lambda}}{dq}\frac{dx^b_{r,\lambda}}{dq}}dq-\sum_{r,\lambda}\frac{e_r}{c}\int A_a\frac{dx^a_{r,\lambda}}{dq}dq$$
$$-\frac{1}{16\pi c}\int F_{ab}F^{ab}\sqrt{-g}d^4x+k\int(R+\Lambda)\sqrt{-g}d^4x \qquad (28)$$

Here $k=\frac{-c^3}{16\pi\gamma}$, and Λ is the cosmological term. The particles are divided into classes indexed by r with different masses and electric charges, also individual particles are indexed by λ inside each class.

In order to obtain field equations and relate the fields with the distribution function $f_r(x,p,q)$, we need to rewrite the first two terms of (25) via this distribution function, then do the variation by fields. Let's rewrite (28), replacing q with t.

$$S=-\sum_{r,\lambda}m_rc\int\sqrt{g_{ab}\frac{dx^a_{r,\lambda}}{dt}\frac{dx^b_{r,\lambda}}{dt}}dt-\sum_{r,\lambda}\frac{e_r}{c}\int A_a\frac{dx^a_{r,\lambda}}{dt}dt$$
$$-\frac{1}{16\pi c}\int F_{ab}F^{ab}\sqrt{-g}d^4x+k\int(R+\Lambda)\sqrt{-g}d^4x \qquad (29)$$

We can express the velocities through the momenta, excluding q by dividing all the equations from (15) by the equation for zero component.

$$\frac{dx^a}{dt}=c\frac{g^{da}(x)p_d}{g^{0d}(x)p_d},\qquad a=1,2,3,4 \qquad (30)$$

Indices r,λ are omitted here, and we took into account that $t=\frac{x^0}{c}$. Substituting (30) instead of velocities in (29), we get the action expressed through momenta.

$$S=-\sum_{r,\lambda}m_rc^2\int\frac{\sqrt{p^{r\lambda}_a g^{da}(x_{r\lambda})p^{r\lambda}_d}}{g^{d0}(x_{r\lambda})p^{r\lambda}_d}dt-\sum_{r,\lambda}e_r\int\frac{A_a g^{da}(x_{r\lambda})p^{r\lambda}_d}{g^{d0}(x_{r\lambda})p^{r\lambda}_d}dt$$
$$-\frac{1}{16\pi c}\int F_{ab}F^{ab}\sqrt{-g}d^4x+k\int(R+\Lambda)\sqrt{-g}d^4x \qquad (31)$$

Next, we replace summation over λ by integration over momenta and space with distribution function $f_r(x,p), x\in R^4, p\in R^4$:

$$S=-\sum_{r}m_rc^2\int\frac{\sqrt{p_a g^{da}(x)p_d}}{g^{d0}(x)p_d}f_r(x,p)d^4xd^4p$$
$$-\sum_{r}e_r\int\frac{A_a g^{da}(x)p_d}{g^{d0}(x)p_d}f_r(x,p)d^4xd^4p \qquad (32)$$
$$-\frac{1}{16\pi c}\int F_{ab}F^{ab}\sqrt{-g}d^4x+k\int(R+\Lambda)\sqrt{-g}d^4x$$

It is impossible to find out experimentally which terms in (32) we deal with. At present, experiments show that the Lambda depends on time. This fact can be instantly obtained from (32), as well as dependence on space.

Reverse transition from the action (32) to the action (31) can be done by substitution $f_r(x,p) = \sum_\lambda \delta(x - x_{r\lambda}(t))\delta(p - p_{r\lambda}(t))$, which can be considered as a verification. So, we got the derivation scheme of the Vlasov–Maxwell–Einstein equations. Let's consider the expression (32), taking into account that the cosmological constant is now used for dark energy modeling [1], [20]. The first three terms of (28) action can play the role of Λ-term in (32), therefore the dark energy can be composed of these three terms with some coefficients.

$$\Lambda_{DE}(x) = -\frac{\lambda_f}{16\pi ck}F_{ab}F^{ab} - \lambda_p \sum_r \frac{m_r c^2}{\sqrt{-g}k}\int \frac{\sqrt{p_a g^{da}(x) p_d}}{g^{d0}(x)p_d} f_r(x,p)d^4p$$

$$- \lambda_{pf} \sum_r \frac{e_r}{\sqrt{-g}k}\int \frac{A_a g^{da}(x) p_d}{g^{d0}(x)p_d} f_r(x,p)d^4p,$$

$$\Lambda_M(x) = -\frac{(1-\lambda_f)}{16\pi ck}F_{ab}F^{ab} - (1-\lambda_p) \sum_r \frac{m_r c^2}{\sqrt{-g}k}\int \frac{\sqrt{p_a g^{da}(x) p_d}}{g^{d0}(x)p_d} f_r(x,p)d^4p$$

$$- (1-\lambda_{pf}) \sum_r \frac{e_r}{\sqrt{-g}k}\int \frac{A_a g^{da}(x) p_d}{g^{d0}(x)p_d} f_r(x,p)d^4p.$$

Here DE (Dark Energy) and M (Matter) stand for dark energy and matter, respectively. One can take into account the contributions of any other fields in the same way. In fact we got the opportunity not to introduce Einstein's Λ–term a priori, but to get its counterpart from the way how classical Lagrangians influence on matter. The signs of electrostatic energy and Λ match here, so, apparently, the repulsion of dark energy is an electrostatic repulsion, and most of the matter which is seen as dark energy, coincides with the cosmic plasma. There is no need to consider any other candidates for dark energy, since we know that there are only two types of long-range actions (gravity and electromagnetism), and any others would have revealed themselves already. This can be well seen from the non-relativistic counterparts of the action, that will be described in the other place. The trace of dark energy was found too: its mathematical contribution to the action is the same as that of Einstein's Λ.

The Vlasov–Einstein–Maxwell equations for the metric and the electric fields are obtained by varying the action (32) by them. First we will vary by metric and get

$$k(R_{ab} - \frac{1}{2}R - \frac{\Lambda}{2})\sqrt{-g} = \sum_r m_r c^2 \int (\frac{1}{2p^0\sqrt{p^d p_d}} - \frac{\sqrt{p^d p_d}}{(p^0)^2 p_0}\delta_0^b) f_r(x,p) p_a p_b d^4p +$$

$$\sum_r e_r \int (\frac{(A_a p_b + A_b p_a)}{2p^0} - \frac{A_d p^d}{(p^0)^2 p_0} p_a p_b \delta_0^b) f_r(x,p) d^4p \qquad (33)$$

$$+ \frac{1}{16\pi c}F_{dc}F^{dc}(-\frac{1}{2}\sqrt{-g})g_{ab}$$

Now we will vary the electromagnetic potentials. We obtain the Maxwell equation in the gravitational field.

$$\frac{2}{16\pi c}\frac{\partial(\sqrt{-g}F^{ab})}{\partial x^b} = \sum_r e_r \int \frac{g^{da}(x)p_d}{g^{d0}(x)p_d} f_r(x,p)d^4p \tag{34}$$

Finally, we got the Vlasov–Maxwell–Einstein equation system (17), (33), (34).

VI. Conclusion

So, we have derived the Vlasov–Maxwell–Einstein equation. There was necessary to synchronize the proper times of different particles. We did this in two ways, first via the proper time of a single particle, second via an "arbitrary parameter" q. It should be noted that similar parameters in various sources are called differently: sometimes affine [17], [21], sometimes canonical [22]; however, parameter q_r (defined by relation $dq_r = ds_r/\sqrt{I_r}$) has principally new physical meaning.

We have derived equations and obtained expressions for effective mass in stationary gravitational and electromagnetic fields for the two metrics. Conversely, we have got solutions that depend only on time. It's interesting to compare the obtained form of the Vlasov–Maxwell–Einstein equations with other versions and to classify them. Usually they are written out only for the Vlasov–Einstein equations and with Christoffel symbols, and therefore not for momenta but for velocities [15], [16], [23], [24]. They can also be derived according to our scheme. When these equations are not derived, but written immediately as given ones, inaccuracies may occur. When it comes to Vlasov-Einstein equations, the deriving seems necessary for the both Liouville equation and field equation. When deriving the Liouville equation, the time synchronization arise. The energy-momentum tensor in the field equations has to be taken arbitrarily, if there is no deriving.

In the transition from (31) to (32) we have obtained the expressions which formally have the same effect as the Einstein's lambda. It seems promising to research all classical substitutions for this equation that are well-known for the Vlasov equation: energetic and hydrodynamic substitutions [11]–[14]. It's also interesting to investigate the stationary solutions [25]–[32]. The problem of classifying all time–dependent (spatially homogeneous) solutions is relevant and interesting too, because it leads to cosmological solutions, which are now being actively studied. The Hamilton–Jacobi equation methods [33]–[38] would be useful here. A very important task is to obtain for the Vlasov–like equations a statement like "time averages" coincide with the Boltzmann extremals [39]–[41].

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Global Journal of Science Frontier Research: A
Physics and Space Science
Volume 19 Issue 4 Version 1.0 Year 2019
Type : Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4626 & Print ISSN: 0975-5896

Prediction of Asphaltenes Deposition in Multiphase Flow Systems through the use of Novel Numerical Modelling

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Keywords: numerical modeling, asphaltenes precipitation, multiphase flow, enhanced oil recovery.

GJSFR-A Classification: FOR Code: 020299

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Strictly as per the compliance and regulations of:

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Abstract- One of the well-known problems encountered in oil flow lines, oil reservoirs and completion strings, causing flow assurance issues, is the deposition of asphaltenes in these areas. The complications aroused due to asphaltenes deposition include, but are not limited to, permeability reduction, wettability reversal, pipeline and well plugging, increased pressure drop and an overall reduction in oil production. The problem is not only severe, but it occurs so abruptly that it can damage the formation in a few days if it proceeds unnoticed. The asphaltenes deposition for a given oil is measured by the use of high-tech and expensive apparatuses, particularly where multiphase flow occurs, which incurs additional costs. Multiphase flow combined with asphaltenes precipitation worsens the situation in well bores and affects the flow of crude oil. This paper presents a numerical modeling approach for prediction of asphaltenes deposition and precipitation in crude oil in multiphase flow by the use of governing equations calculated using finite difference discretization methods. These numerical models belong to the family of front-capturing-models which permit the capture of the depositing front on a fixed mesh. The paper also presents a model for studying the effect of CO_2 injection on asphaltenes precipitation during enhanced oil recovery from the reservoir. The developed numerical models are validated against each other. The parametric effect on deposition of crude oil was modeled and studied against experimental values. The numerical models and resulting simulations were in good agreement with the steady-state solution of the asphaltenes onset curve.

Keywords: numerical modeling, asphaltenes precipitation, multiphase flow, enhanced oil recovery.

Highlights

- A new numerical model for predicting asphaltenes deposition is presented.
- Another model accounts for the effect of CO_2 injection on asphaltenes precipitation.
- The numerical models were in good agreement with a steady-state solution.
- Simulations revealed that asphaltenes become more unstable in the presence of CO_2.

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I. Introduction

The shift in oil and gas producing systems to offshore and subsea areas in the past few decades has increased the need to study the fluid properties related to flow assurance problems (Patin, Stanislav, & Ian, 2001). Deposition and precipitation of asphaltenes are one of these potential problems, and it is often catastrophic. The general problems related to asphaltenes precipitation are fouling in extraction facilities and plugging of wells and lines (Hasanvand, Ahmadi, & Behbahani, 2015). To avoid asphaltenes deposition, proper control strategies must be developed from the beginning of production. Either a comprehensive experimental procedure or the development of a prediction model is required to understand the problems before their occurrence. The issue with modeling the prediction of asphaltenes requires a large number of parameters, which makes the model highly complex. The drawback of such a model is that its solution will require more processing power and time to achieve the desired results (Yap, et al., 2012). This effect is further enhanced in the multiphase flow because there are three different phases (i.e., gas, liquid, and solid), that must be incorporated to obtain accurate results. The phases generated in the flow path are due to various reasons such as pressure depletion or a change in the composition of the oil. The generation of the solid phase creates flow assurance problems during primary production of crude oil or in enhanced oil recovery processes involving the injection of CO_2 (Ali, Dahraj, & Haider, 2015). In previous studies, researchers have found some major parameters that affect asphaltenes deposition, such as molecular weight, solubility, temperature, and pressure. Various models have been developed, but they do not account for the effect of asphaltenes deposition on multiphase flow. This paper presents thenumerical model for the prediction of asphaltenes deposition under such conditions.

Before discussing the previous models developed by various scientists for the prediction of asphaltenes deposition, it must be taken into account that asphaltenes precipitation and deposition is not a reversible process, as indicated by various researchers (Nasrabadi, Moortgat, & Firoozabadi, 2016). The reason for the irreversibility of the process is the colloidal nature of asphaltenes suspensions, and this was verified by previous experimental observations. Therefore, there is an intense need to understand the possible conditions under which asphaltenes will deposit in the well. Numerical modeling provides an alternative and economical solution in the prediction of asphaltenes deposition, especially at higher temperatures and pressures under multiphase flow conditions (Attar, 2015). The modeling of asphaltenes initially started from the thermodynamic models based on the solubility parameters, leading to multiple descriptions of Statistical Associating Fluid Theory (SAFT). Various researchers have used the experimental results as the basis for the prediction of asphaltenes deposition, but it was found that an optimized numerical model produces more reliable results compared topredictions based on experimental values (Behbahani, Ghotbi, Taghikhani, & Shahrabadi, 2014).

The following section describes the various models developed for predicting asphaltenes deposition, leading to the numerical model developed and studied in this paper.

II. The Different Types of Existing Models

The various existing models can be classified into two categories: compositional models and mechanistic models (Yap, et al., 2012). The compositional models use various forms of equations of state to predict the phase equilibrium for asphaltenes precipitation, whereas the mechanistic models are based on the formulation of homogeneous liquid hydrocarbon mixtures (e.g., crude oil).

a) *The steric-stabilization model*

The steric stabilization model was presented by (Leontaritis, Kawanaka, & Mansoori, 1987). The model is based on Nellensteyn's concept of asphaltenes as the solid particles produced in crude oil, which are insoluble and peptized by the resins that are absorbed on their surfaces. According to this model, the asphaltenes are produced when the chemical potential of the resin is higher than the critical value. The compositional value is expressed by the following equation:

$$\Delta\mu_2 = RT[\ln\varphi_2 - (r-1)(1-\varphi_2) + r\chi(1-\varphi_2)^2] \quad (1)$$

where $\Delta\mu_2$ is the difference between the chemical potentials of the resins in solution and in their reference state, *R* the gas constant, *T*is temperature, $\phi_2$is the volume fraction of the resins, χ is the interaction parameter between resins and solvents, and *r* is the ratio of the molar volumes of the resins to the solvent. This model was initially successful in predicting the asphaltenes precipitation up to certain limits of temperature and pressure. However, it was mainly used for data regression. This model has certain limitations. For example, multiphase systems cannot be integrated because of the assumption of a single flowing phase used in this model. Conversion to multiphase flow without modification results in undefined outcomes. For example, as proposed in the model, the presence of any resin on the surface needs to be physically tested. In numerous studies, it has been found that inaccessible asphaltenes fractions are stable in particular solvents(Arya, et al., 2017). Thus, the existence of resins is not an essential requirement for the formation and stabilization of asphaltenes (Subramanian & Simon, 2015). Due to such major drawbacks and no inclusion of multiphase flow, the model does not seem capable of predicting asphaltenes precipitation.

b) *The thermodynamic models*

i. *The Flory-Huggins equation*

This model is based on the Flory-Huggins equation for polymer solutions which considers the asphaltenes solvated in the liquid medium. This technique differentiates the liquid-solid apart from the vapor-liquid equilibrium during multiphase flow modeling. The procedure follows the vapor-liquid calculations at an initial stage. After that, a modification is used for the liquid phase in which the vapor phase stays unaffected. The limitation of this model is that the solid-vapor equilibrium is not taken into account. Under the action of high pressure and temperature, some gases such as CO_2 affect the asphaltenes precipitation. Thus, the model is missing vital parameters for asphaltenes prediction during multiphase flow. Further work on this model was carried out by Hirschberg and co-workers (Hirchberg & Meijer, 1984). They eliminated any chances for the presence of resin and considered asphaltenes as single dispersed solvated macromolecules (Wu & Prausnitz, 1998). Following the various generalizations for this equation, the highest volume fraction of soluble asphaltenes in the crude oil is expressed as follows:

$$\varphi_a^{max} = \exp\left[\frac{v_a}{v_l}\left(1 - \frac{v_l}{v_a} - \frac{v_l}{RT}(\delta_a - \delta_l)^2\right)\right] \quad (2)$$

where $\phi_a^{max}$is the maximum volume fraction of soluble asphaltenes in the crude, *v* is the molar volume, δ is the solubility parameter, and *a* and l refer to the asphaltenes and the liquid medium, respectively.

ii. *Cubic equations of state*

A few researchers have used the cubic equations of state for predicting the behavior of asphaltenes precipitation. Various forms of cubic equations of state are available and modified. For example, Gupta used a solid phase fugacity with a Peng-Robinson model (Nikookar, Pazuki, Omidkhah, & Sahranavard, 2008). The combination of data from Nuclear Magnetic Resonance (NMR) with Alexander's correlations and the Redlich–Kwong equation of states provides the basis for the numerical model (Jaramillo, Galeana, & Manero, 2006). Nonetheless, as observed in previous models, the selection of molar weights and heteroatom content are critical to being able to present unrelated results. The interaction parameters (i.e., pressure, volume and temperature) must be considered during asphaltenes precipitation because of the changes in the solubility with changes in these major parameters. Nonetheless, these parameters had to be tailored for each n-alkane,and all of the changes in these parameters were applied in all of the equations rather than just considering them to be constant(Stachowiak, et al., 2005). The major issue with the models based on cubic equations of states is that they cannot simulate the upper onset pressure boundary by tuning the model parameters to the lower onset pressure boundary.

c) The association EOS

The most advanced forms of the equation of states include association EOS for predicting phase equilibria based on Statistical Associating Fluid Theory (SAFT). Research has shown that the models based on SAFT are somewhat acceptable to use for predicting asphaltenes precipitation, as evident from the works of (Firoozabadi & Li, 2010), (Wu & Prausnitz, 1998), (Chapman, 1989), (Ting, Hirasaki, & Chapman, 2003), (Ting D. , 2003), and Gil-Villegas (Gonzalez, et al., 2004). The issue with the models based on the associating equation of states is the same as that of cubic EOS. That is, the model takes sufficient time for characterization of the oil, especially the heavy oil, considering all of the parameters that make the model complex. Andersen and Speight explained this in a short and concise manner: “The more realistic the model becomes, the more complex it will be. The complexity as well gives rise to an increase in unknown parameters which in turn will have to be estimated or fitted to the experimental data” (Andersen & Speight, 1999).

In the present paper, a new numerical model has been developed using a novel approach to describe flow restrictions in the wellbore and near-wellbore area due to asphaltenes precipitation in multiphase flow. This model is capable of identifying and predicting potential flow assurance problems. In the wellbore numerical model described below, numerical methods (such as implicit finite difference discretization) along with a specific type of black/heavy oil and appropriate Equation of State compositional models are used. The application of Equation-of-State updates the properties and the equilibrium calculations between all of the phases (oil, gas, and asphaltenes).

The governing equations of the wellbore model consist of mass conservation of every phase and every component, momentum conservation of the liquid and gas phases, and energy conservation of the mixture of fluids. The governing equations are calculated using finite difference discretization methods. The simulation results indicate that asphaltenes deposition can begin in the middle of the well. Furthermore, they show that asphaltenes deposition is greatly influenced by CO_2, and the location of deposition is altered to the lower part of the well in systems containing CO_2.

The following section also describes the transport model based on rheological equations of state, a three-phase interacting system, and correlations for multiphase flow. The prediction model incorporates mass profiles as a function of pressure and temperature along with changes in the rheological properties of crude oil as it flows through the pipe.

III. Material and Methods

A simulation of asphaltenes deposition in the wellbore was performed with a heavy oil sample. In this simulation, the bubble point pressure of the fluid took place in the middle of the wellbore. Furthermore, the effect of CO_2 on asphaltenes deposition in the same sample was investigated. This simulation, however, can adequately demonstrate the effect of CO_2 on asphaltenes deposition in the production well. It applies to the discovery of CO_2 in enhanced oil recovery.

The input parameters for this case study were obtained from an Australian oil field. A 2400 m well was considered in this case study, which is at the primary production stage. The well is located in a reservoir with an initial pressure of 38 MPa and functioning at a wellhead pressure of 12.9 MPa. The multiphase flow simulation is carried out for this well to analyze its performance for flow assurance concerns. Figure-1 shows the schematic of the flow system in the well pipeline. An initial composition of oil is flowing through the pipe of height “h” and radius “r”. The crude oil is a hydrocarbon mixture of ‘’n’’ number of components. The effects of temperature and pressure are considered for equalmole fractions of three phases (i.e., liquid, solid, and gas). The crude oil enters from the bottom of the pipe, which has an inside radius of “r(a)”. The multicomponent oil flows through the pipe at a temperature “T_o” and pressure “P_o”. The oil flows in the upward direction, cools along the length of the pipe, and expands under reduced pressure. The crude oil temperature also changes with the forced convection heat transfer process. This change in temperature and pressure conditions results in asphaltenes deposition along the wall of the wellbore pipe. The radius of the pipe at this area reduces to “r(w)”. As the layer of asphaltenes grows, it faces shear removal forces due to the flow of upcoming oil and gas.

When the flow of oil “Qs” is considered as turbulent, the asphaltenes layer is assumed to form asa laminar sub-layer. Three zones are developed under such conditions: a laminar sub-layer, a transition zone, and a turbulent main.

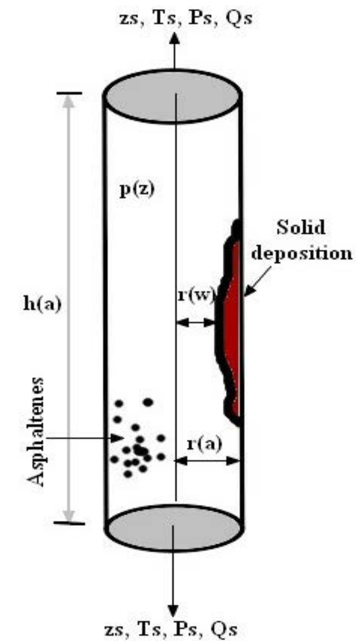


Figure 1: Modelling solid deposition in a well bore

The input parameters for this case study are obtained from tan Australian oil field, and are presentedin Table 1. Table 2 shows the composition of the fluid sample and the fluid's characteristics. These tables are used for better understanding of the simulation applied in this case study.

Table 1: Input parameters for simulation of asphaltenes deposition in the wellbore with a specific fluid sample

Well Data		Reservoir & Fluid Data	
Well Height	2400 m	Net pay zone	60 m
Max. grid size	15.2 m	Reservoir pressure	90 MPa - 922 Kg/cm^2
Top ambient temperature	15.6 °C	Reservoir temperature	320°F - 160°C
Bottom ambient temperature	100 °C		
Total heat transfer coefficient	20.4kJ/m^2.hr.°C		
Tubing ID	0.070 m		
Wellhead pressure	12.4 MPa		
Oil productivity index	2.7m^3/MPa.m.day		

Table 2: Fluid characterization and composition of the fluid sample

Component	Pc (MPa)	Tc (R)	VC (m^3 /kg.mol)	Mw (kg/kg.mol)	Acentric factor	Parachor	Volume shift	Primary composition
CO_2	7.3780	547.56	0.09408	44.01	0.225	168.17	0	0.0246
Cl-CO_2	4.6092	360.61	0.10258	17.417	0.015127	92.19	0	0.4041
C_3-C_5	3.9517	732.89	0.23784	53.516	0.1793113	195.33	0	0.0755
C_6-C_{19}	2.0092	1135.31	0.85649	164.423	0.655007	512.21	0	0.2719
C_{20}-C_{30}	1.2094	1419.29	1.81247	340.927	1.064023	1016.51	0	0.1064
C_{31+}	0.9871	1682.93	3.53022	665.624	1.371778	1944.21	0	0.0774
Asphaltene	0.9871	1682.93	3.53022	665.6224	1.371778	1944.21	0	0.0401

a) Assumptions for proposed Multiphase Flow model

The mass conservation equation for multiphase flow was developed using the following assumptions and was then applied for predicting asphaltenes precipitation in the well bore.

a. The single-dimensional flow was assumed along the length of the well in vertical, horizontal and deviated inclinations. The assumption is acceptable for pipelines of smaller diameters, as in our case.
b. Spatial averaging and Eulerian time were applied.
c. For the cases of the three-phase flow, water-oil slippage was considered and calculated using the well indices values for each phase.

d. The pressure for all of the phases (i.e., liquid, solid and gas) is considered to be the same. This assumption is considered reliable when the concentration of gas is negligible compared with those of the liquid and solids during multiphase flow in the pipeline.
e. A thermodynamic equilibrium is considered between the phases. Various approaches such as black oil and compositional approaches were applied to calculate the fluid properties and state relations.

b) Development of the Mathematical Model

Based on these assumptions, the flow equations developed for the liquid and gas phases are as follows:

$$\frac{\partial(\rho_O\alpha_O)}{\partial t}+\frac{1}{A}\frac{\partial(A\rho_O\alpha_O u_O)}{\partial x}=\psi_O-\Gamma_g \quad (3)$$

$$\frac{\partial(\rho_g\alpha_g)}{\partial t}+\frac{1}{A}\frac{\partial(A\rho_g\alpha_g\mu_g)}{\partial x}=\psi_g+\Gamma_g \quad (4)$$

where ψ_o and ψ_g are the oil and gas mass influx terms, and ρ_g and ρ_o are the oil and gas mass densities. Along with an appropriate definition of the interphase transfer term, Equations 3 and 4 result in decreasing the number of primary unknowns. This approach leads to a faster simulation runtime as well as application of the state relations using either compositional phase property calculations or black oil property calculations. The addition of solid particles to the fluid flow results in new sets of mass conservation equations, which are as follows:

$$\frac{\partial(A\hat{\rho}_O\alpha_O x_{nc}+Ac_a\alpha_O)}{\partial t}+\frac{\partial(A\hat{\rho}_O\alpha_O u_O x_{nc}+Au_O c_a)}{\partial x}=A\left(\dot{\hat{\psi}}_{O,nc}+\dot{\hat{\gamma}}_a-\dot{\hat{m}}_{da}\right) \quad (5)$$

where c_a is the asphaltenes concentration in the crude oil, γ is the flocculation of solid particles from the reservoir, and m_d is the deposition rate of the solid particles. Equation 5 is applied to fluids that contain asphaltenes and cause asphaltenes flow assurance problems. Equation 6 is used for fluids with precipitation potentials.

$$\frac{\partial\left(\sum_{i=1}^{NWA\,X}A\hat{\rho}_O\alpha_O x_i+Ac_w\alpha_O\right)}{\partial t}+\frac{\partial\left(\sum_{i=1}^{NWAX}A\hat{\rho}_O\alpha_O u_O x_i+Au_O c_w\right)}{\partial x}=A\left(\sum_{i=1}^{NWAX}\dot{\hat{\psi}}_{O,i}+\dot{\hat{\gamma}}_w-\dot{\hat{m}}_{dw}\right) \quad (6)$$

Here, c_w is the wax concentration in the crude oil. To solve Equations 5 and 6 for asphaltenes and wax mass conservations, a similar approach for the solution component concentration (mole per volume) at a specific time is considered. Solving the equation in grid block "*i*" (the goal of gridding is to transform the model into a discrete system to solve the flow equations), we obtain the following equation:

$$\begin{aligned}N_{k,i}^{n+1}&=N_{k,i}^{n}+\frac{\Delta t}{V_b^n}A_{i-1}^n\left[(\hat{\rho}_O\alpha_O u_O)_{i-1}^{n+1}x_{k,i-1}^n+\left(\hat{\rho}_g\alpha_g u_g\right)_{i-1}^{n+1}y_{k,i-1}^n\right]\\&-\frac{\Delta t}{V_b^n}A_i^n\left[(\hat{\rho}_O\alpha_O u_O)_i^{n+1}x_{k,i}^n+\left(\hat{\rho}_g\alpha_g u_g\right)_i^{n+1}y_{k,i}^n\right]\\&+\Delta t\left[\dot{\hat{\psi}}_{Ok,i}^{n+1}+\dot{\hat{\psi}}_{gk,i}^{n+1}+\dot{\hat{\gamma}}_{a,i}^{n+1}-\dot{\hat{m}}_{da,i}^{n}\right]\end{aligned} \quad (7)$$

When the number of moles of component *k* per bulk volume (N$N_{k,i}^{n+1}$) is obtained, the overall mole compositions of the hydrocarbon phases in the grid block *i* are updated. The next step involves the flash calculations of the concentration of asphaltenes at a new time step. In Equation 6, the solid deposition rate $m_{da,i}^n$ is used for the old time step. The process can be reiterated using a new deposition rate and new solid concentrations until convergence is achieved. The new concentrations are used for updating the concentrations of fluid species and solid precipitates in grid block *i using* PHREEQC module, which is a specialized geochemical model(Parkhurst & Wissmeier, 2015)for the reaction among rocks, water and solid precipitates (asphaltenes in our case). The next concern is the evolution of asphaltenes deposits, finally resulting in complete clogging of the wellbore. The cross-sectional area of well bore pipe decreased due to solid deposition, resulting in production loss. The cross-sectional area at the new time step is calculated as follows:

$$A_i^{n+1}=A_i^n+\frac{V_{s,i}^n}{\Delta_{xi}} \quad (8)$$

Equation 8 can follow the progress of solid deposition in each wellbore grid block. The model is used for predicting the decline in the flow of crude oil due to solid deposition.

c) Effect of CO_2 injection

According to (Darabi, 2014), additional flow assurance issues are introduced into the reservoirs and the wellbores by applications of CO_2 and light hydrocarbon gas injections for the enhanced oil recovery process. Most conventional oil fields have reported asphaltenes deposition as the most challenging issue during the CO_2 flooding process, and there is the need to conduct proper studies of that effect. As evident, the presence of light components can upsurge the bubble point pressure and the onset pressure of asphaltenes in the crude oil. (Vargas, et al., 2009)Applied PCSAFT EOS in the description of the impact of light components on the behavior of the asphaltenes phase. As in the case of the asphaltenes precipitation modelling approach, the impact of composition on the asphaltenes onset pressure is not rigorously included. Instead, the pressures of different temperatures are well defined as input variables for use in the process. PCSAFT EOS may not be recommended for the entire variety of compositions because the Cubic Equation of State is modified to only one set of compositions for asphaltenes precipitation. This is because it applies to the binary interaction coefficients. To reduce modification errors for asphaltenes precipitation models, experimental values are used for the asphaltenes onset pressure. Table 3 shows the onset pressure of the fluid for different molar ratios of CO_2 to oil.

Table 3: Asphaltenes onset pressure and temperature for different mixing ratios of CO_2

Onset Temperature (°F) – (°C)	0% CO_2	5% CO_2	10% CO_2	15% CO_2
100 - 37.7778°C	4600	4770	4930	5100
93 - 33.8889°C	5045	5165	5285	5400
88 - 31.1111°C	5450	5545	5640	5735
82 - 27.7778°C	5960	6000	6045	6085
77 - 25°C	6660	6625	6590	6560
71 - 21.6667°C	7580	7445	7310	7170
66 - 18.8889°C	8650	8430	8210	7995
63 - 17.2222°C	9545	9175	8810	8440

Table 4: Reservoir fluid composition for different mixing ratios of CO_2

Component	0% CO_2	5% CO_2	10% CO_2	15% CO_2
CO_2	0.0246	0.07337	0.12214	0.17091
Cl-C2	0.4041	0.383895	0.36369	0.343485
C3-C5	0.0755	0.071725	0.06795	0.064175
C6-C19	0.2719	0.258305	0.24471	0.231115
C20-C30	0.1064	0.10108	0.09576	0.09044
C31+	0.0774	0.07353	0.06966	0.06579
Asphaltenes	0.0401	0.038095	0.03609	0.034085

d) Development of the Computational Model

A comprehensive computational model is designed for the evaluation and prediction of asphaltenes in wellbores, as shown in Figure-2. The model incorporates asphaltenes prediction with and without injection of CO_2 in the well. The model starts with defining and inputting the variables that affect asphaltenes precipitation. The assumptions are also included in the next step, which defines the flow of the model. The next step is to update the temperature and pressure in the loop for evaluating the asphaltenes precipitation later on. Equations 2 and 3 are used to calculate the phase equilibria in the next step. All the physical properties, such as the density, viscosity, and temperature of crude oil, are determined in this step, and the diameter of the pipe is updated. Equations 5 and 6 are used for evaluating for asphaltenes precipitation in the next stage. If precipitation doesn't occur under the given conditions, the loop is repeated for changed values of temperature and pressure. If asphaltenes are present, further calculations are made for its verification and are matched with the original data obtained from the Halibut oil field (Australia). If asphaltenes are formed, and the nominal diameter of the pipe decreases to a reduced size, the simulation is stopped, confirming the asphaltenes precipitation. If no asphaltenes are formed, the loop is repeated back for the changing temperature and pressure values. After the initial determination of asphaltenes under the given conditions, the effect of CO_2 injection is also studied. This loop can be run or stopped as required. With the injection of CO_2, the asphaltenes mass calculations are made along with changes in the nominal diameter of the wellbore. Upon confirming the asphaltenes precipitation, the loop stops. In the case of no change in pipe diameter, the loop is repeated to change the CO_2 concentration pressure and temperature for a new iteration. Figure-2 is the schematic for the computational model used for asphaltenes deposition and precipitation in multiphase flow.

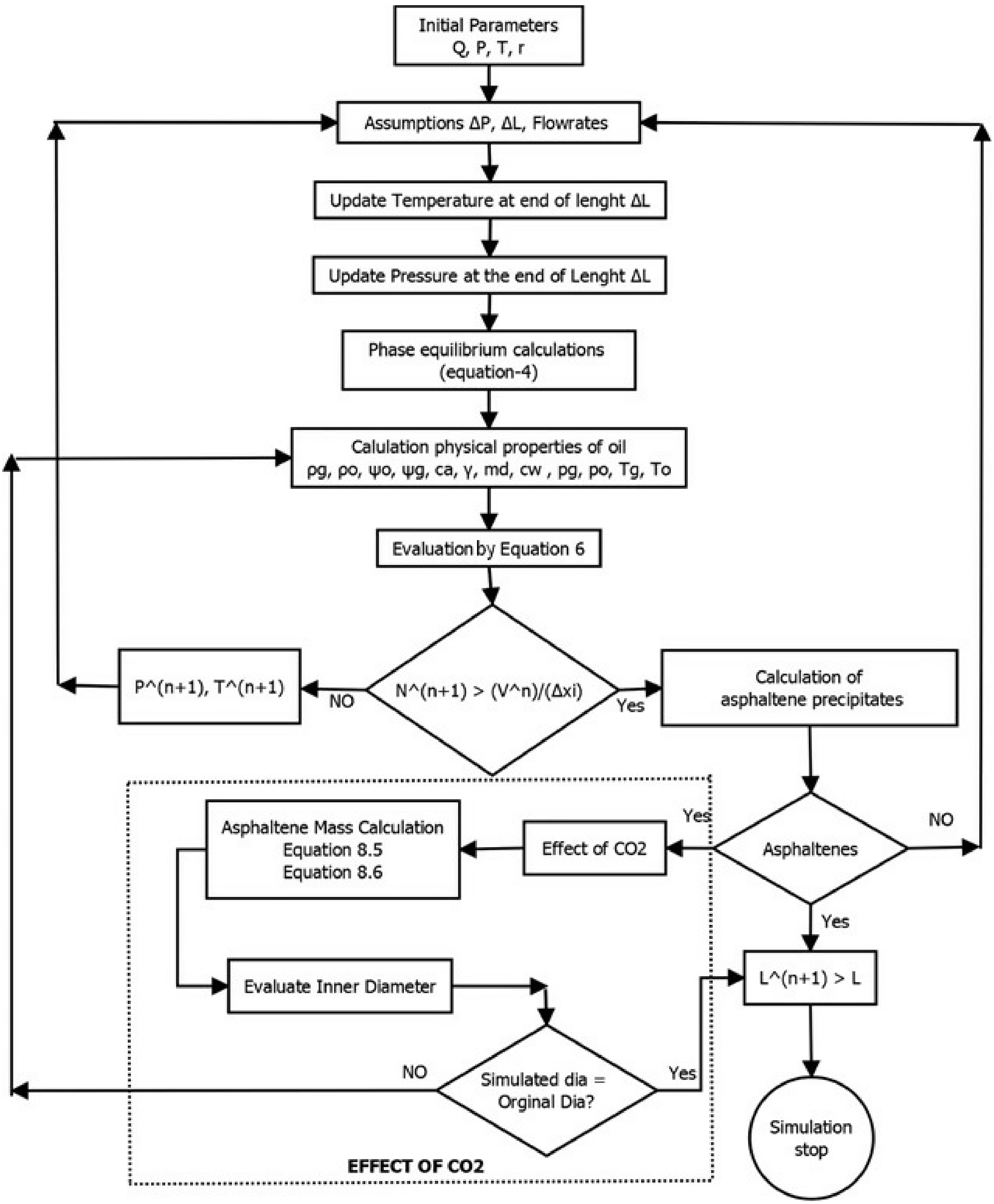


Figure 2: Computational model for solid deposition in a well bore for both cases (with and without CO_2)

IV. Results and Discussion

This study has considered a working example of Tan oil field for the analysis of asphaltenes deposition problems. The data of pressure-temperature profiles was available. The natural fractured reservoir has the pressure of 922Kg/cm^2 and temperature of 160 °C. The average oil produced by this well is 32°API and the average bubble point pressure is 132Kg/cm^2. The data of impact of phase behavior on asphaltenes deposition is already available from experiments conducted by the industry. This data includes the extended compositional analysis and asphaltenes phase boundaries. The SARA analysis provides a complete PVT analysis for the fluid. Table-2 provides the fluid characterization and composition of the fluid sample. Matlab was used for solving the equation 7 and 8 for asphaltenes deposition in every grid block. The programming in Matlab has been done according to the developed computational model in figure-2. The conditions for simulation are based on the assumptions described in section 3.1. Following are the results from simulations for the developed numerical model.

Figure-3 indicates that the maximum asphaltenes precipitation takes place at approximately the bubble point pressure, in which the solubility of asphaltenes is at a minimum. In fact, when gas is released from the crude oil, the asphaltenes components increase their stability and solubility in the oil.

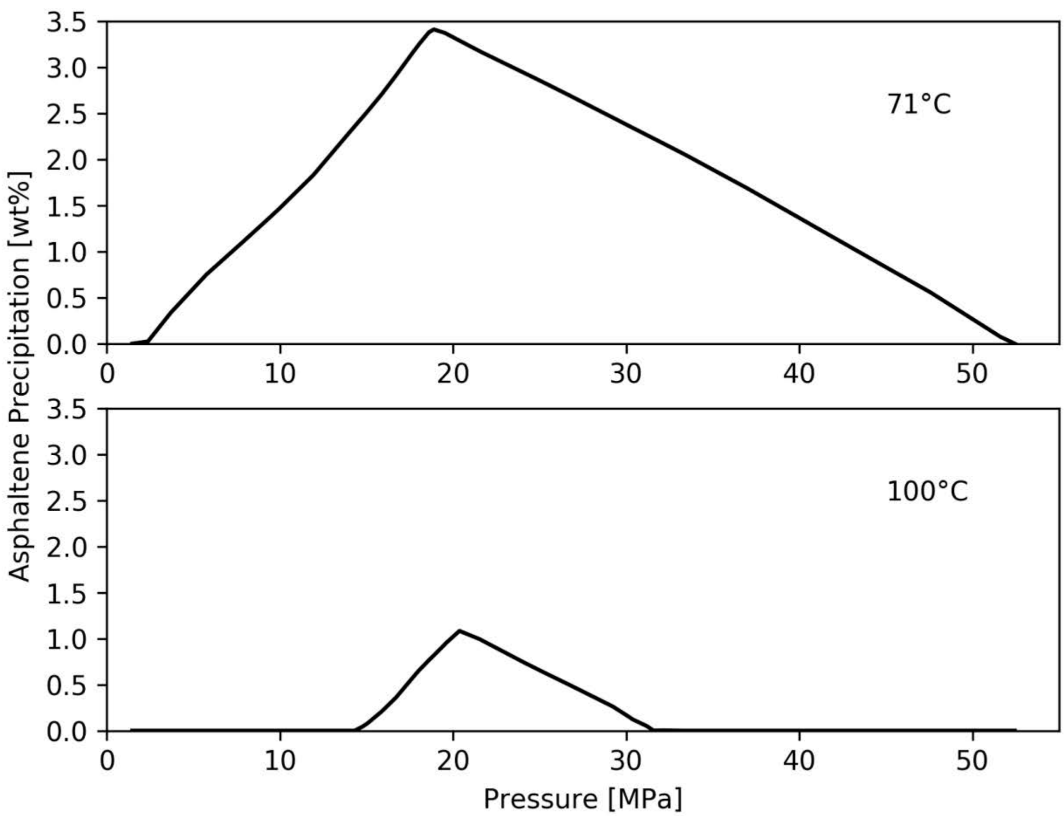


Figure 3: Weight percent of asphaltenes precipitation as a function of pressure at different temperatures.

The steady-state solution of the well is obtained at the initial time and then drawn on the vapor/liquid equilibrium and asphaltenes onset curve, as illustrated in Figure4.

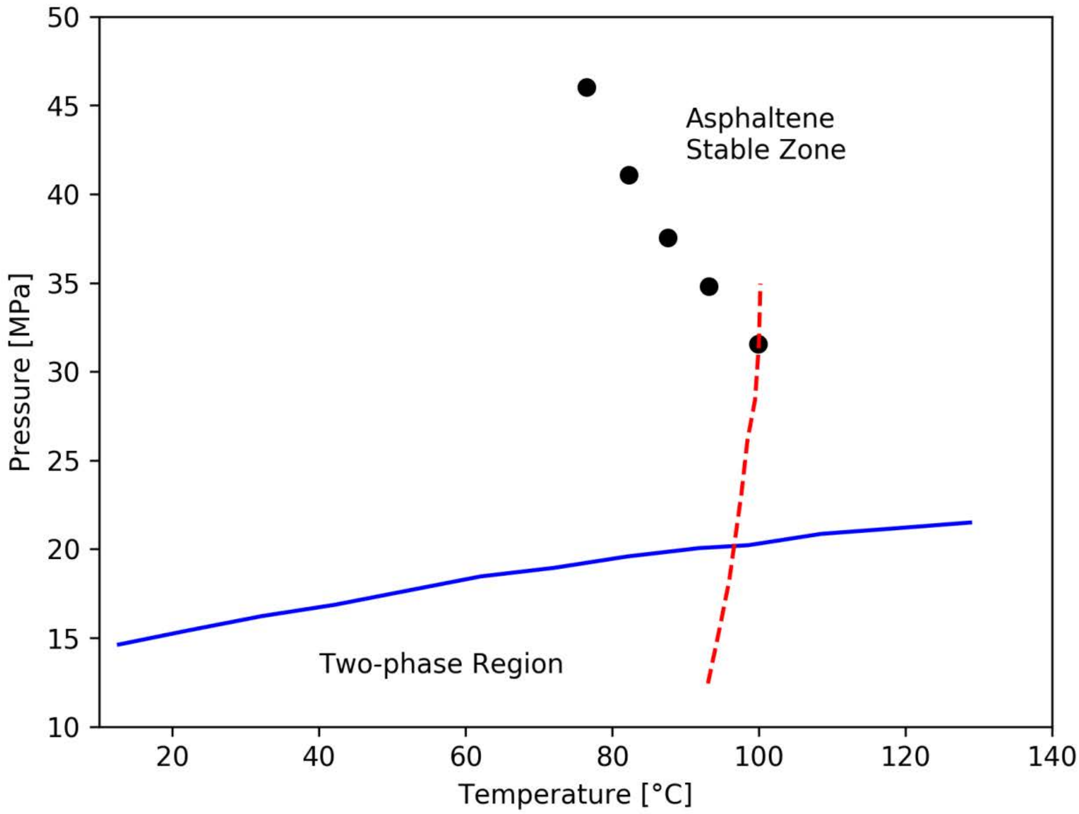


Figure 4: Pressure and temperature route from the bottom of the well to the surface at zero time (dashed red line), asphaltenes onset pressure (black dots) and fluid saturation line (solid blue line)

As evident, the pressure-temperature (P-T) path at initial conditions, as indicated by the blue line, shifts from the asphaltenes stable zone towards the asphaltenes unstable zone. At the same time, the blue line shifts towards the two-phase region. Therefore, according to this study, it is understandable that the well can hypothetically experience asphaltenes precipitation. Moreover, the study proceeds with the simulations for calculating the asphaltenes deposition rate and with measuring the quantity of asphaltenes precipitation accumulated in the well. A graph of asphaltenes precipitation as a function of depth is plotted for different temperatures in Figure-5.

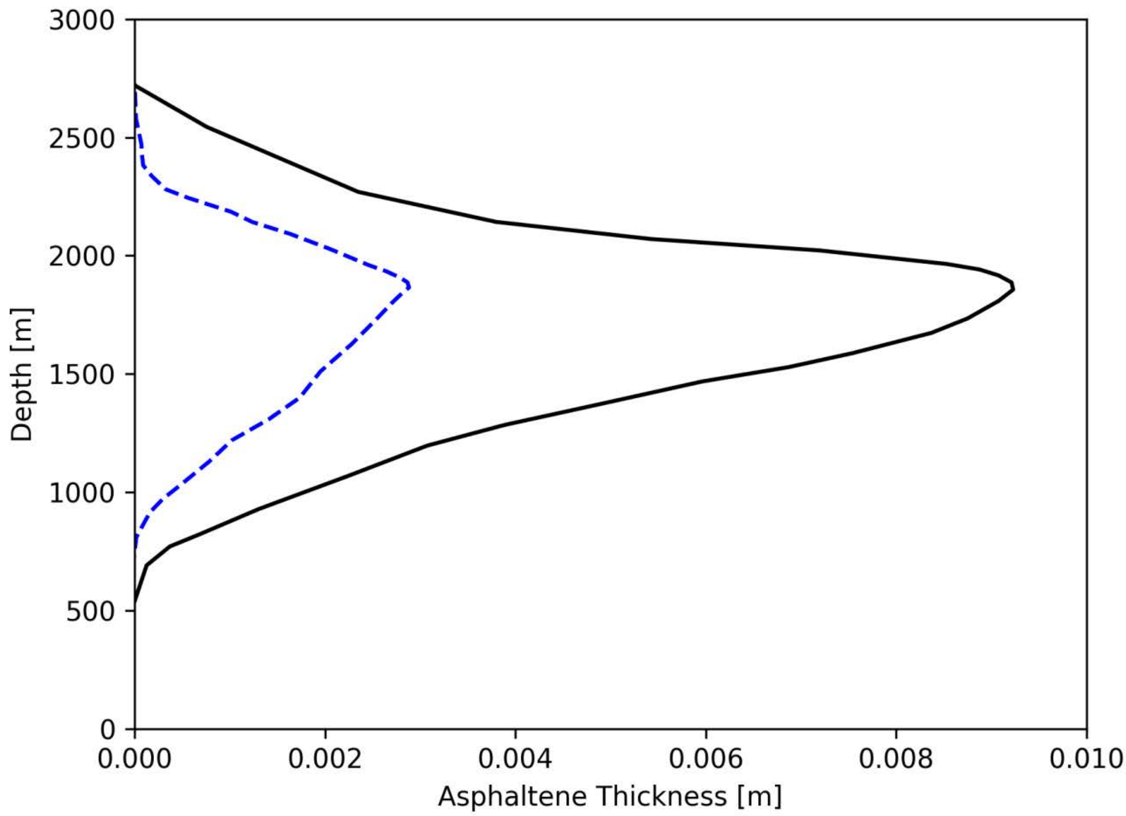


Figure 5: Thickness of asphaltenes deposit on the inner surface of the wellbore at 20 days (dashed blue line) and 90 days (solid black line)

It is expected that more asphaltenes precipitation will be evident in the upper part of the well. This is because of the fact that temperature changes drastically in the wellbore, and the temperature of the wellbore is lower in the upper section.

The magnitude of asphaltenes deposition and the rate of deposition in the wellbore can be obtained through conducting simulation runs for the wellbore. The wellbore's cross-sectional area is considerably changed by the asphaltenes deposition within the wellbore, as evident in Figure-5, which displays the profile of the inner radius of the well as a function of time. Evidently, the wellbore's cross-sectional area begins to shrink below 2030 m depth, although a minimum asphaltenes thickness is attained at 846 m below the surface. Small dents are observed at the surface of the precipitated asphaltenes as a result of the elimination of asphaltenes by shear forces. The remnant profiles of asphaltenes flocculated in the wellbore are shown in Figure-6. Indeed, the concentration of asphaltenes attains a maximum value at 846 m depth, and this behavior substantiates the maximum deposition at that instant.

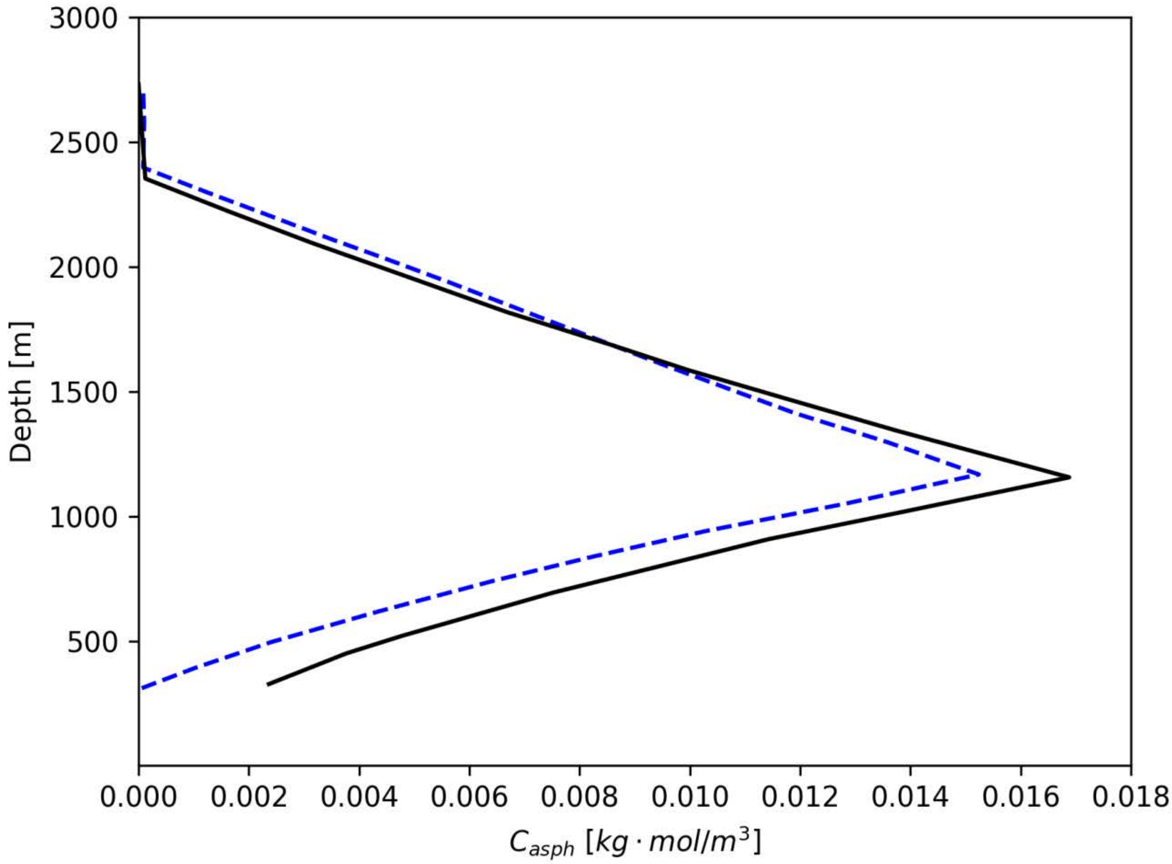


Figure 6: Concentration profiles of asphaltenes flocculate in the wellbore at 20 days (dashed blue line) and 90 days (solid black line).

Parameters such as pressure, temperature, and velocity profiles in the wellbore can subsequently change due to the deposition of asphaltenes particles. For that reason, it also impacts the volume of fluid influx coming from the reservoir. It is important to note that the bottom-hole is pressurized by asphaltenes deposition because of blockage of the wellbore. This pressurization is also contributed to by the rise of frictional forces existing between the surfaces of accumulated asphaltenes and the flowing fluid. As a result, asphaltenes deposition minimizes the influx from the reservoir through the wellbore.

Variations in the fluid temperature inconsistently increase the asphaltenes precipitation while reducing the probability of asphaltenes sticking on the surface of the well. The variation of pressure at bottom-hole as a function of time is shown in Figure-7.

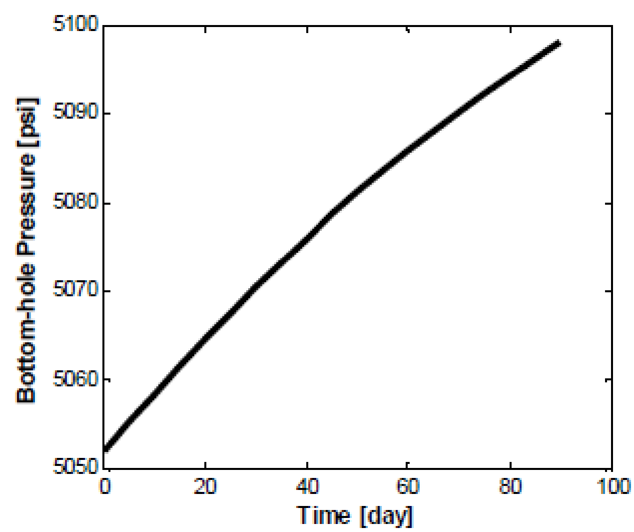


Figure 7: Variation of bottom-hole pressure due to asphaltenes deposition with time elapsed.

The asphaltenes particle blockage in the wellbore increases the pressure exerted at the bottom-hole as time elapses.

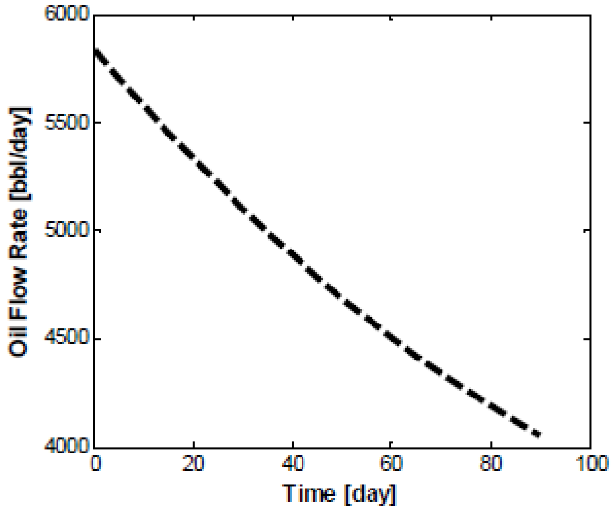
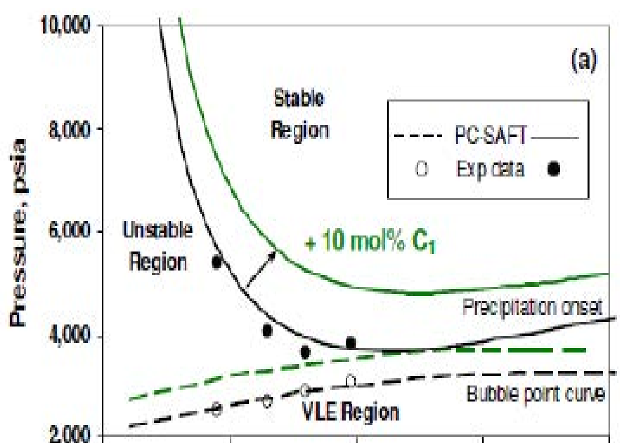


Figure 8: Variation of oil flow rate due to asphaltenes deposition with time progression

a) *Effect of CO_2 on asphaltenes deposition*

This section shows the simulation of the effect of CO_2 on asphaltenes precipitation and deposition in the wellbore in general. Additionally, the simulation process targets capturing the condition where CO_2 is extracted in the production well and is combined with the crude oil. In a previous study, Vargas (2009) demonstrated that the presence of light components or impurities in crude oil significantly alters the phase behavior of oil. The author has also claimed that asphaltenes lose stability when natural gas or CO_2 is injected with the oil. In Figure-9, it is clear that the results for the effect of CO_2 on the P-T phase are in accordance with Vargas's claims. Additionally, the input onset pressures as shown in Figure-9 (c)follow the same trend as the composition of oil after mixing with CO_2in Table 4.



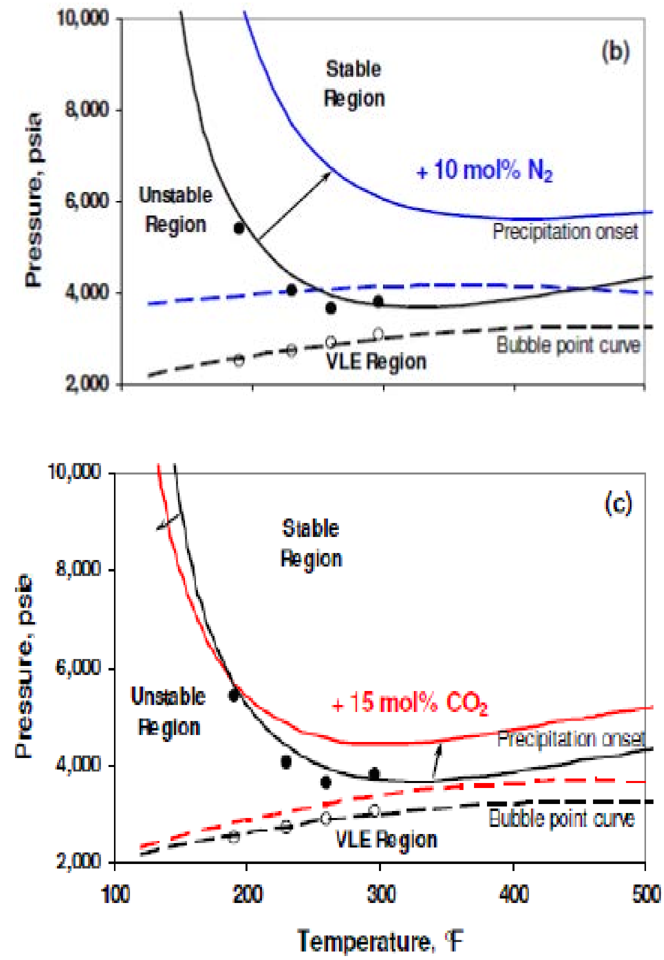


Figure 9: Effect of light hydrocarbons mixing on the stability of asphaltenes in crude oil. (a) Effect of methane, (b) effect of nitrogen (c) effect of CO_2 (from Vargas, 2009).

The amount of asphaltenes precipitation can be calculated from the asphaltenes precipitation module with the help of new ratios of the oil and the input of onset pressures of asphaltenes. Additionally, the amount of asphaltenes precipitation is shown in Figure-10 for different molar ratios of CO_2 at a temperature of 100°C. Figure-10 shows that greater asphaltenes precipitation is expected with higher contents of CO_2. Subsequently, multiphase flow simulations were performed in the wellbore for an extended period with significant amounts of CO_2 in the reservoir fluid.

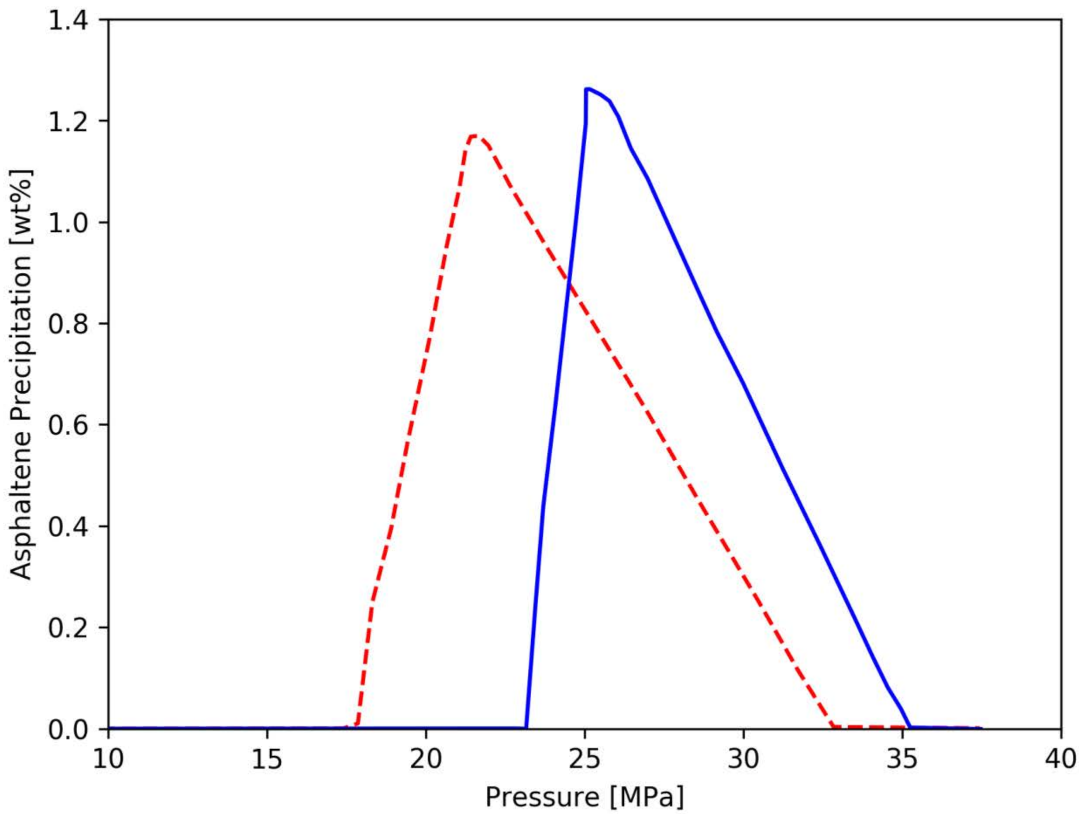


Figure 10: Weight percent of asphaltenes precipitation in the presence of CO_2 with 5% CO_2 (red dashed line) and 15% CO_2 (blue solid line) at 100 °C.

Similar input data were also used for the wellbore and reservoir geometries to ascertain the credibility of the results. The temperature of 100°C, the asphaltenes concentration profiles for different compositions of the reservoir oil were sampled and illustrated, as shown in Figure-11. It is clear that the asphaltenes concentration is zero in the presence of perforations, and it begins to flash out from crude oil at lower temperatures and pressures within the upper sections of the wellbore. It is observed that the presence of higher amounts of CO_2 lowers the starting point of asphaltenes precipitation in the wellbore, as shown in Figure-11.

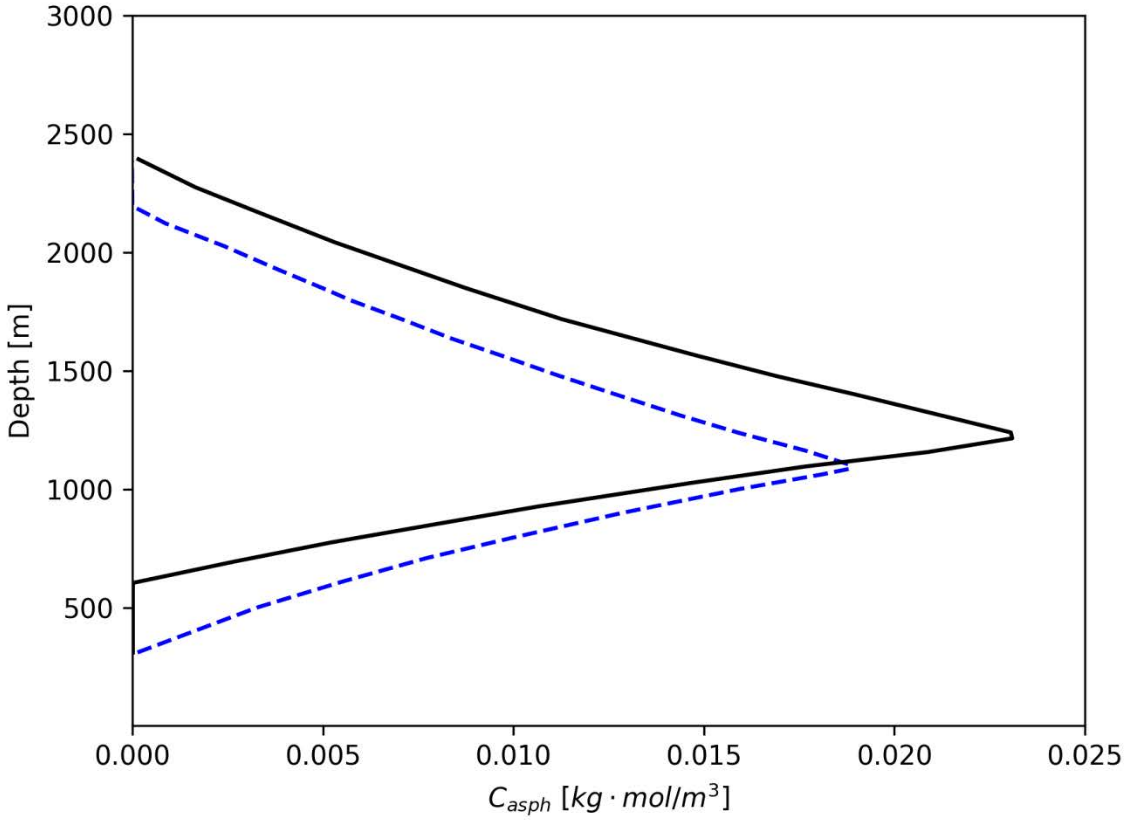


Figure 11: Asphaltenes concentration profiles at the end of 90 days of production in the wellbore with 5% CO_2 (blue dashed line) and 15% CO_2 (black solid line)

Therefore, more asphaltenes accumulated at the bottom of the well when more CO_2 was in the production well.

This simulation reveals that CO_2 can indirectly alter the pressure and temperature profiles through varying the velocity fields within the wellbore. As a final point, this section considers the propagation of asphaltenes deposition on the surface of the wellbore as illustrated in Figure-12.

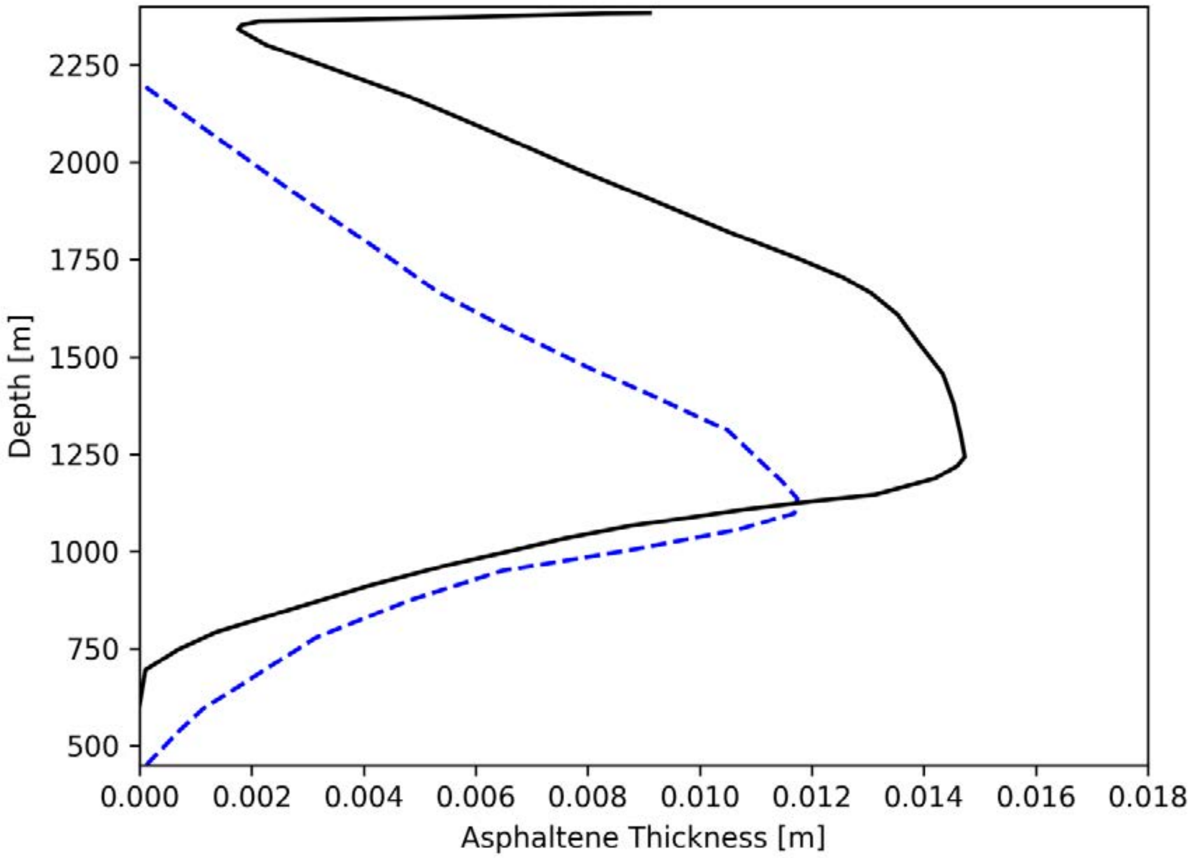


Figure 12: Asphaltenes deposition thickness profiles at the end of 90 days of production in the wellbore with 5% CO_2 (blue dashed line) and 15% CO_2 (black solid line).

The presence of CO_2 can cause plugging of the wellbore to occur at a faster rate than if CO_2 is absent, and itspresence also moves the maximum plugged cross-section toward the bottom of the well during the deposition process.

V. Conclusion

The asphaltenes prediction model was developed based on the finite difference method. The deposition problems in wells with proven records were simulated using the developed numerical model. It was observed from the results that the deposited layer of asphaltenes has more thickness at the upper part of the well due to the low temperature and pressure area, favoring the instability of the dissolved asphaltenes. It is noted that the maximum asphaltenes precipitation takes place near the bubble point pressure. The effects of velocity changes, pipe diameter, and pressure variations were investigated in this paper. It is found that a decrease in velocity decreases the heat exchange rates of the wellbore fluid and surroundings. Blockage in the wellbore increases the bottom-hole pressure with time. Additionally, the effect of CO_2 injection for enhanced oil recovery was studied, and it was found that asphaltenes become more unstable in the presence of CO_2.

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Global Journal of Science Frontier Research: A
Physics and Space Science
Volume 19 Issue 4 Version 1.0 Year 2019
Type : Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4626 & Print ISSN: 0975-5896

The Schottky Effect and Cosmos

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Abstract- Adiabatic decomposition into fundamental forces without limiting their range of applicability contradicts both the stability of the crystal and the stability of the Universe, which leads to numerous "anomalies". Analysis of the microscopic substantiation of the Schottky barrier and, in general, the final values of the measured macroscopic parameters of substances made it possible to clarify the LAW of the dependence of any potentials on the distance to the object, which corresponds to the minimum work function of the particles to infinity. At the same time, the fundamental forces correspond only to approximations of the total potential determined by this LAW in a certain area. The deviations of the canonized Coulomb or gravitational potential from the obtained total potential correspond exactly to the "anomalies" of the Schottky barrier for charges and "black holes" for gravity.See the preamble in the addendum to the article.

GJSFR-A Classification: FOR Code: 020103

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Strictly as per the compliance and regulations of:

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0. Ordin S.V., "UNSCEBABLE TRUTH", 11.04.2019. 2 pp., http://www.rusnor.org/pubs/articles/15867.htm

I. Schottky Barrier

In my popular articles, I have repeatedly noted that there are still unsolved problems even in elementary electrostatics [1, 2]. Showed, solutions to some of them. It showed that I had to think out and quickly correct for more than 40 years of research at the Academy of Sciences, when the models traditionally used to interpret the experimental data gave "black holes". But remaining within the framework of purely Coulomb ideas, which, as will be shown in this work, are only qualitative, we ourselves, faced with large quantitative discrepancies, create imaginary problems and invent "new effects".

If the system does not have many-particle interactions, i.e. collective effects, then, according to the principle of superposition, the total energy of interaction of all particles in the system is simply the sum of the energies of pairwise interactions between all possible pairs of particles. At the same time, we learned long ago to take into account the "infinite" number of positive and negative elementary charges not only in vacuum, but also in a solid body, not only in the form of macroscopic forces acting on macro-objects, but also in the form of forces acting on an elementary (minimum) charge.

Thus, in a linear approximation, in a solid body we obtain measurable ≡ finite values of parameters by simple summation of infinite, but convergent series. The condition of the convergence of the series gives us the fact that at short distances between particles the forces act short-range, giving the dependence of the potential on the reciprocal of the distance with a degree z above three, whereas at large distances the Coulomb law works with the dependence of the potential on the reciprocal of the distance with a degree z a unit.

Based on the above, a number of crude assumptions were made. First, a separation of "fundamental" forces was made and canonized, which are only members of the adiabatic expansion in the order of smallness. Secondly, only macroscopic long-range Coulomb forces connected with the three-dimensionality of our geometrical space, and even then at not very large distances, leaving a "loophole" to other dimensions for short-range forces, and for "Einstein" forces at large distances.

But all this will still be shown with a joint account of the Coulomb and gravitational forces (in the framework of the Coulomb Newton Laws). In the meantime, let us take into account what has already been obtained with reference only to the "infinite" number of elementary charges - the emergence of the Schottky barrier on the boundary of a solid body. This potential barrier to the exit of electrons from a solid, in the case of lightly doped semiconductors, corresponds to the energy gap between the bottom of the conduction band inside the semiconductor and the vacuum level outside the semiconductor. And taking into account the scale factors, model constructions in solids are applicable to cosmology. Moreover, they allow her to return to reality.

The number of atoms in one cubic centimeter is more than the number of astronomical objects observed now in the "infinite" universe. But this large number of atoms does not give grounds for us to build "alternative" cubic centimeters, as it is now accepted in cosmology.

But initially it was necessary (when analyzing the experiments) to eliminate the error of Schottky himself [3, 4], the two in the calculations of the barrier height, which in the calculations of microelectronics [5] were compensated by the erroneous semiconductor nonideality coefficient, and to clarify the shape of the barrier, which they tried to correct with macroscopic formulas of Richardson-Demscher, introducing a "hanging in the air" volume charge [6]. Formally, this contradiction was eliminated by the introduction of the Bardeen layer [7], which was a 100% amendment and in itself contained a great deal of uncertainty associated with surface states [8].

But it was possible to more accurately describe the current-voltage characteristics if we set the barrier in the form of a rectangular step [9]. This microscopic

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description, simply ignoring the macroscopic calculations of the Schottky barrier, allowed us to remove from the “anomalies” discharge the Prigogine local thermodynamic effects — the giant Thermo-EMF observed in semiconductor structures [10, 11,12, 13, 14] .

To strictly determine the parameters of the potential barrier near the boundary of the object, and in its volume, we carry out model calculations based on the principle of superposition of the potentials of atomic cores in the crystal lattice.

If initially we use the Coulomb potential. then, setting all constants equal to one, we obtain its reduced dependence on the coordinate

$$\varphi = \frac{1}{Abs[x]} \qquad (1)$$

If we set the distance between the nearest sources of potential (step) equal to one for the one-dimensional case, we obtain the distribution of the potential shown in Fig.1.As can be seen from Fig. 1, with an increase in the number of lattice sites, the minimum height of the inter-node barrier decreases, which limits the free motion of a particle in energy and, accordingly, the height of the boundary barrier of the crystal, which limits the free motion of a particle along the coordinate, increases.In this case, naturally, the potential barrier that prevents the electron from leaving the crystal also grows.

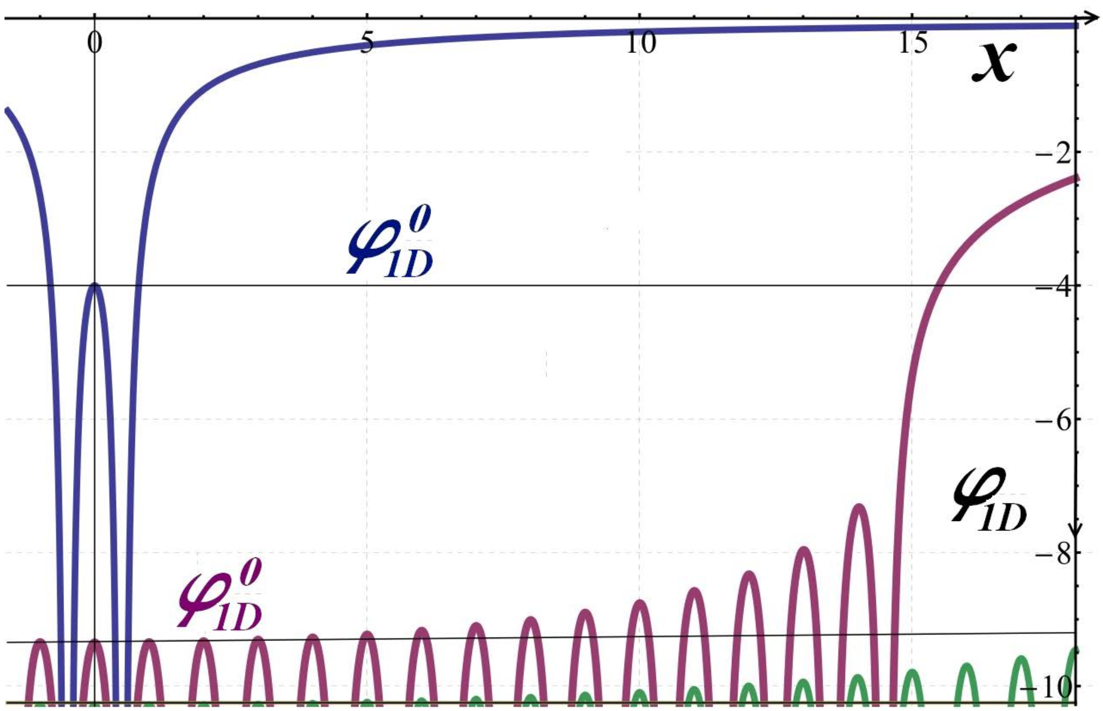

Fig. 1: Dependence of the spatial distribution of the Coulomb potential in the one-dimensional case and the bottom of the conduction band on the number of steps / periods.

But when using the long-range Coulomb potential, even in the one-dimensional case, as the number of attraction nodes tends to infinity, the contribution from all nodes to the height of the barrier in the center tends to infinity

$$\varphi_{1D}^{0} = \sum_{n=-\infty}^{\infty} \frac{1}{Abs[0.5+n]} \to \infty \qquad (2)$$

Those.as applied to an electron, the bottom of the conduction band goes down infinitely deep. The increase in the dimension of the object due to the additional attraction of the surrounding nodes is a tendency to infinity, it only naturally intensifies, which directly contradicts all the experimental data, in particular the final value of the Schottky barrier at the boundary of the lattice by vacuum. Therefore, at short distances, short-range forces were introduced with a higher steppe. For the three-dimensional case, with a not very strict reference to symmetry, the degree was chosen more than three (usually 4 or 5). But using the modified formula 1, we obtain the dependence of the potentials for all three dimensions of objects:

$$\varphi_{1D}^{0}=\sum_{n=0}^{\infty}2\left(\frac{1}{Abs[0.5+n]}\right)^{z}=1\cdot\sum_{n=-\infty}^{\infty}\left(\frac{1}{Abs[0.5+n]}\right)^{z}$$

$$\varphi_{2D}^{0}=\sum_{n=0}^{\infty}2\pi\left(Abs\left[n+0.5\right]\right)\left(\frac{1}{Abs[0.5+n]}\right)^{z}=\pi\sum_{n=-\infty}^{\infty}\left(\frac{1}{Abs[0.5+n]}\right)^{z-1} \qquad (3)$$

$$\varphi_{3D}^{0}=\sum_{n=0}^{\infty}4\pi\left(Abs\left[n+0.5\right]\right)^{2}\left(\frac{1}{Abs[0.5+n]}\right)^{z}=2\pi\sum_{n=-\infty}^{\infty}\left(\frac{1}{Abs[0.5+n]}\right)^{z-2}$$

which (as will be seen later) differ from the one-dimensional case only by a factor, equal, with a sufficient distance from the center, to the volume of the surface of the object of unit thickness. Expressed via Zeta functionspresented in Figure 2.

$$\varphi_{1D}^{0}=2.\left(-1.+2^{z}\right)Zeta\left[z\right]$$

$$\varphi_{2D}^{0}=2\pi\left(-1.+2.^{-1.+z}\right)Zeta\left[-1.+z\right] \qquad (4)$$

$$\varphi_{3D}^{0}=4\pi\left(-1.+2.^{-2.+z}\right)Zeta\left[-2.+z\right]$$

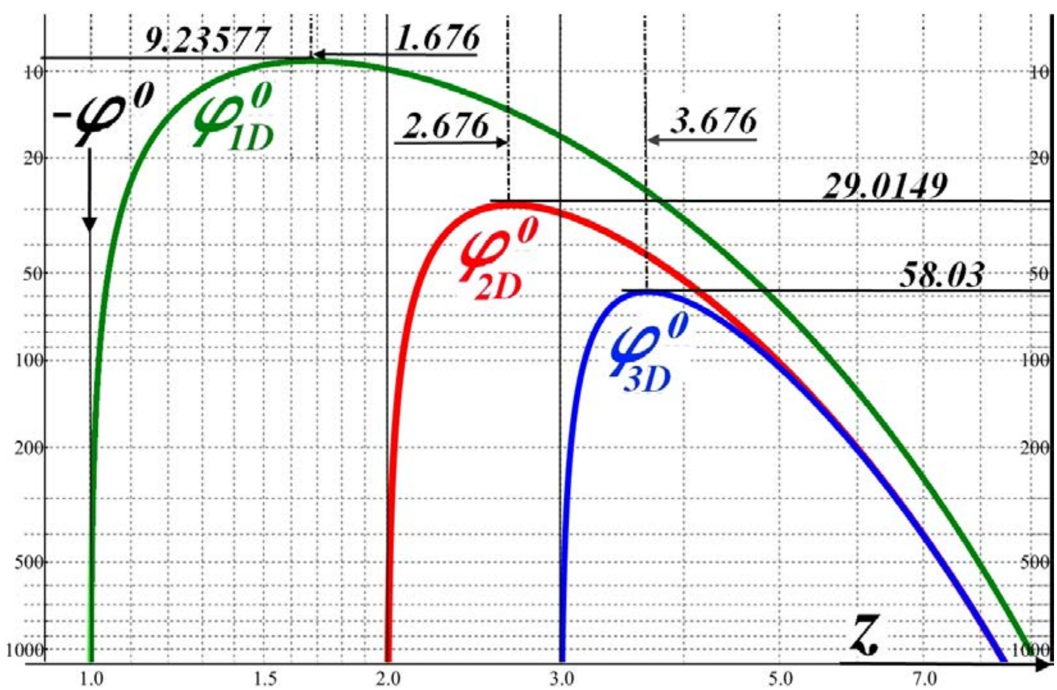

Fig. 2: The dependence of the height between the nodal barriers on the degree for different dimensions of objects.

Formulas 4, as it followed from f.3, differ from each other only by a factor determined by the dimension of the object and the displacement in the z degree by one for the two-dimensional case and by two for the three-dimensional case. All three dependences on z have similarly displaced extremes, with deviations from which there is a catastrophic (exponential) tendency of the height of the potential barrier, as shown in Fig. 1, and f.2, to infinity minus (the depth of the bottom of the conduction band tends to infinity) .

Whereas all experiments on any materials point to specific hospital beds, CHARACTERISTIC heights of the Schottky barriers at the border. This gives grounds to assume that the REAL dependence of the potential on the distance corresponds not to the Coulomb unit, but to the degree of extremum.

$$\varphi=\left(\frac{1}{Abs[x]}\right)^{1.676} \tag{5}$$

And the rapid convergence of the series on the basis of such a power dependence corresponding to the extremum makes it possible to calculate the Real course of the potential of an object of any dimension and any size

$$\varphi_{1D}^{0}=1\sum_{n=-k}^{k}\left(\frac{1}{Abs[0.5+n+x]}\right)^{1.676},\varphi_{2D}^{0}=\pi\sum_{n=-k}^{k}\left(\frac{1}{Abs[0.5+n+x]}\right)^{1.676} \tag{6}$$

$$\varphi_{3D}^{0}=2\pi\sum_{n=-k}^{k}\left(\frac{1}{Abs[0.5+n+x]}\right)^{1.676}$$

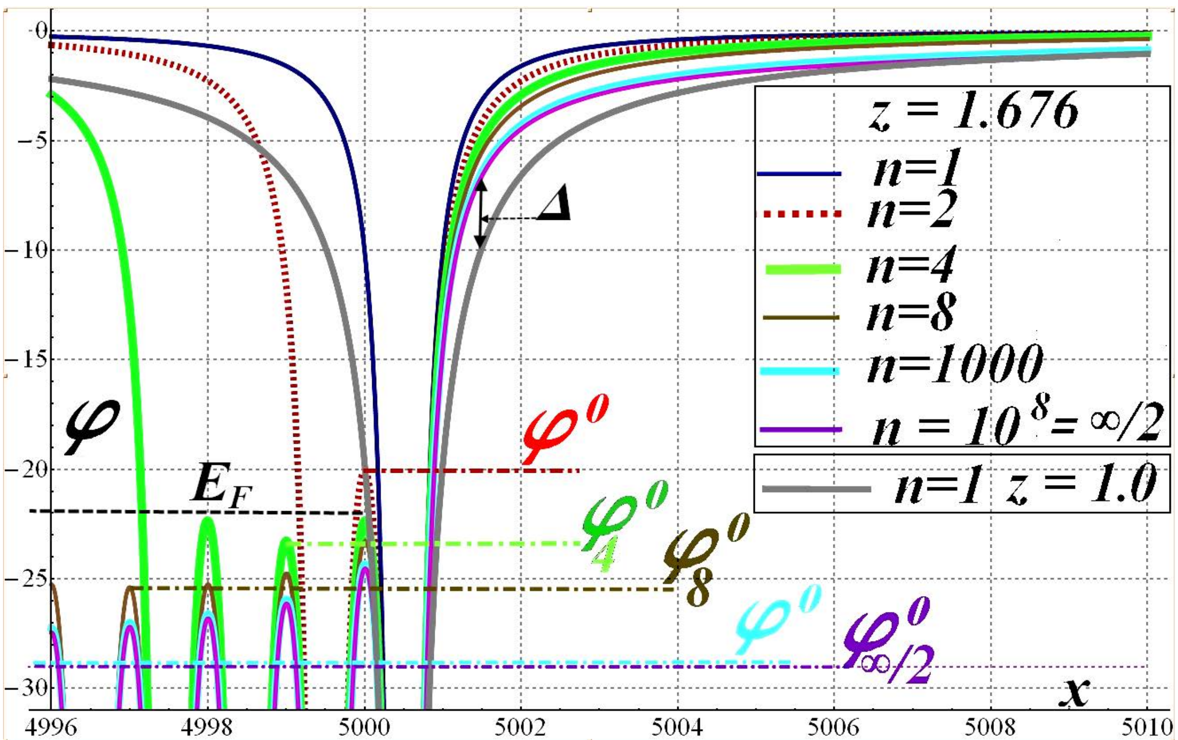

Fig. 3: True potential distribution near the flat boundary of a three-dimensional crystal for different number of steps n (monatomic flat layers) and the imposition (in gray) on the Coulomb potential (z= 1) of the monatomic plane with charge multiplied by π

The rapid convergence of the series on the basis of such a power dependence corresponding to the extremum makes it possible to calculate the Real potential variation near the boundary of a three-dimensional object of any thickness (any number of steps n), including semi-infinite. in the form of a sum of potentials in the center, equidistantly located disks of infinite radius (Fig. 3).

The potential distribution presented in Fig. 3 naturally removes the question of the infinite depths of the bottom of the conduction band φ^0. At the same time, such a linear mapping of the true potential distribution provides a visual representation of the dependence of the true depth of the conduction band on the thickness of nano-objects and the effective concentration of current carriers in the subsurface layer (the difference between the E_F and the interstitial barrier near the border).

But the fundamental point of the difference between the true potential of the Coulomb potential at the boundary is that the degree z of a semi-infinite crystal depends on the distance beyond the crystal boundary — it runs through the values from the maximum 1.676 directly at the boundary to zero at infinity.

The physical nature of this "zero" will be discussed in the analysis of gravity. Now we only note an important consequence — the difference in Δ of the height of the local near-surface true potential from the Coulomb potential, which is attributed to the "volume charge" in emission models. In fact, as can be seen from Fig. 3, a large Δ value does not correspond to some additional barrier above the vacuum level, but is simply an excess of the true course of the potential above the Coulomb one at small distances from the border. Therefore, in the microscopic models, the steeper than the Coulomb form of the Schottky barrier is often replaced with just a rectangular potential step.

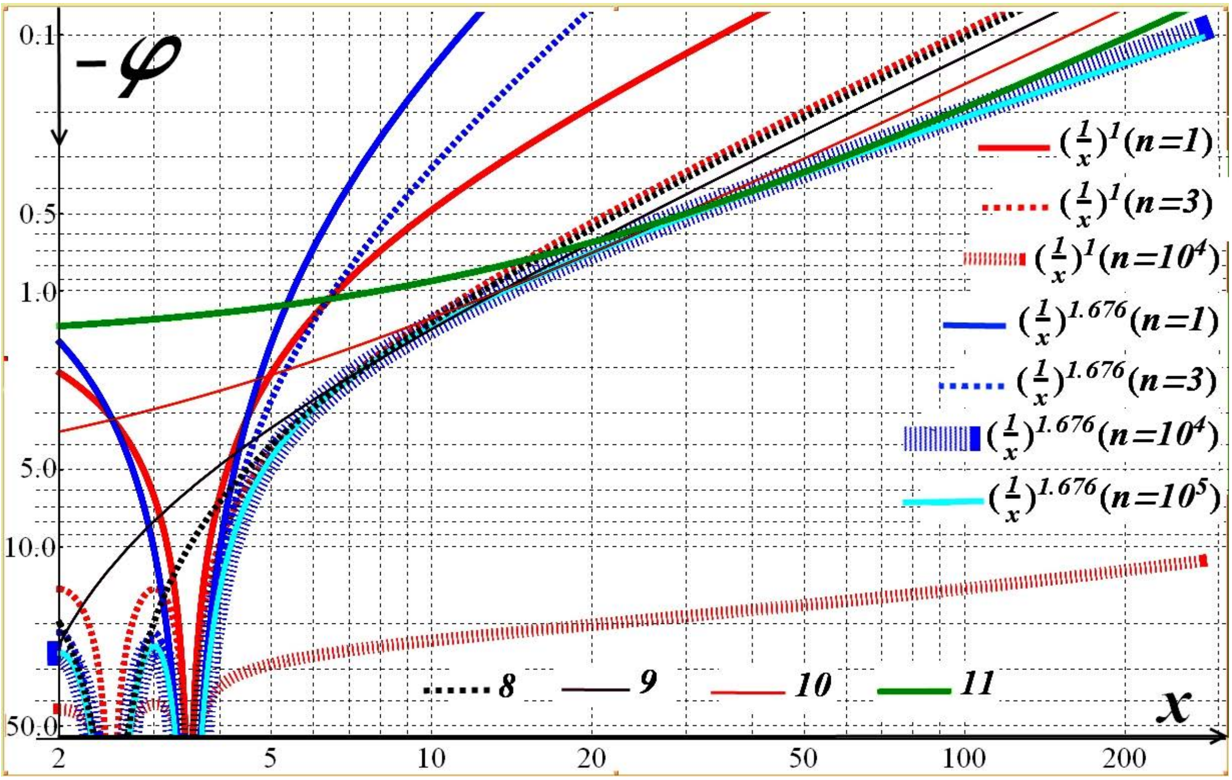

Fig. 4: The spatial distribution of the Coulomb and true potential on a flat boundary for different numbers of steps — monatomic flat layers in a crystal and Coulomb approximations of the true Schottky barrier of a semi-infinite crystal (curves 8 ÷ 11).

On the linear scale of Fig. 3, the course of the true potential (z = 1.676) and the Coulomb potential (z = 1) at large distances seem to almost coincide. But the strict correspondence of the course of the true potential to the course of the Coulomb charged plate is possible only at one point. In a large range of changes in the coordinates, this is demonstrated in a double logarithmic scale in Fig.4.

Used in Fig.4.the scale emphasizes how catastrophically both the depth of the conduction band bottom φ^0 would decrease and the near-surface potential, if their formation were determined by a purely Coulomb potential — compare the curves $(1/x)^1(n=10^4)$ and $(1/x)^{1.676}(n=10^5)$. But at the same time, the finiteness of these actually measured values indicates that the real potential determines the total energy of the crystal as a whole! And the fundamental question arises about the conventionality of division in general into short-range and long-range forces, since An additive contribution to the full potential of only long-range Coulomb forces would be enough to compress the crystal to a point.

Therefore, the INFINITE corrections for the pendant in the form of shielding are required, with the finite values of the parameters being obtained at an infinity ratio.

The Coulomb (and, running ahead - gravitational) field cannot provide a stable (albeit stationary) state of the system of field sources in a 3-dimensional space.

But initially, we finish an elementary analysis that shows not only the reason for introducing the "semiconductor nonideality coefficient" to describe the current-voltage characteristics of pn junctions using Coulomb calculations with the "correction" on the volume charge, but also the cause of macroscopic "experimental confirmations" of Coulomb calculations.

As noted above, the spatial distribution of the true surface potential outside the crystal (corresponding to a stable state of the crystal as a whole, without collapse), is described by a power dependence of the reciprocal of the distance to the boundary with a variable degree z = 1.676 ÷ 0. And therefore, strict coincidence, taking into account the first derivatives of the true potential with the Coulomb potential, is possible only at one point. And then, with the introduction of amendments to the amount of charge. But nonstrict Coulomb approximations (curves 8 ÷ 11 in Fig. 4) describe areas of $L_1 \div L_2$ of the true surface potential, which are different from the border, with good accuracy, but when the starting point of the report shifts into the crystal Δx^* and the effective charge Q^* increases.

Curve 8 - $\Delta x^* = -1$, $Q^* = 10/\pi$ $L_1 \div L_2 \sim$ $6 \div 9$

Curve 9 - $\Delta x^* = -2$, $Q^* = 12/\pi$ $L_1 \div L_2 \sim$ $8 \div 11$

Curve 10 - $\Delta x^* = -5$, $Q^* = 16/\pi$ $L_1 \div L_2 \sim$ $12 \div 26$

Curve 11 - $\Delta x^* = -16.5$, $Q^* = 22/\pi$ $L_1 \div L_2 \sim$ $30 \div 55$

And so, the analysis of the true potential, which is basic for galvanic phenomena, is naturally useful for designing elements of micro and nanoelectronics. But, initially, it requires "combing" their design, and adjusting many of their dynamic parameters - starting with clarifying the true capacitance of capacitors, to clarifying the characteristics of the p – n junctions. In addition, it requires combining the theory of radiation, which is determined, as is known, by derivatives of the charge potential.

But it should be noted once again that relative units were used everywhere. At the same time, the obtained digital values can vary and sometimes nonlinearly. So presented in Fig.2 and 3, the limit heights of the barriers depend on the relative concentration of the centers of attraction:

$$\varphi^0 = \pi \sum_{n=-\infty}^{\infty} \left(\frac{1}{Abs\left[0.5 + k \cdot n\right]} \right)^{1.676} \tag{7}$$

With a multiple increase in the step between nodes by a factor of k (corresponding to a decrease in the relative concentration of centers), as shown in Fig. 5, the Schottky barrier decreases at the boundary of a semi-infinite three-dimensional crystal.

The presented potential distributions in a crystal ignore the fact that only a relatively small number of atoms are ionized in lightly doped semiconductors, i.e. the fact that in calculations that were originally built on simplified, valid, as noted, at sufficiently large formulas, the locality of the potential of the ionized nucleus is also not taken into account.

In addition, the analysis is qualitative, because It does not take into account a significant factor - local screening of the potentials of the lattice nuclei, which changes the depth of the bottom of the conduction band. But even from the fraction of the total number of atoms, the infinite lattice must have stability, and for a stable existence, the fraction of the nuclear charge must have a true power dependence, not Coulomb.

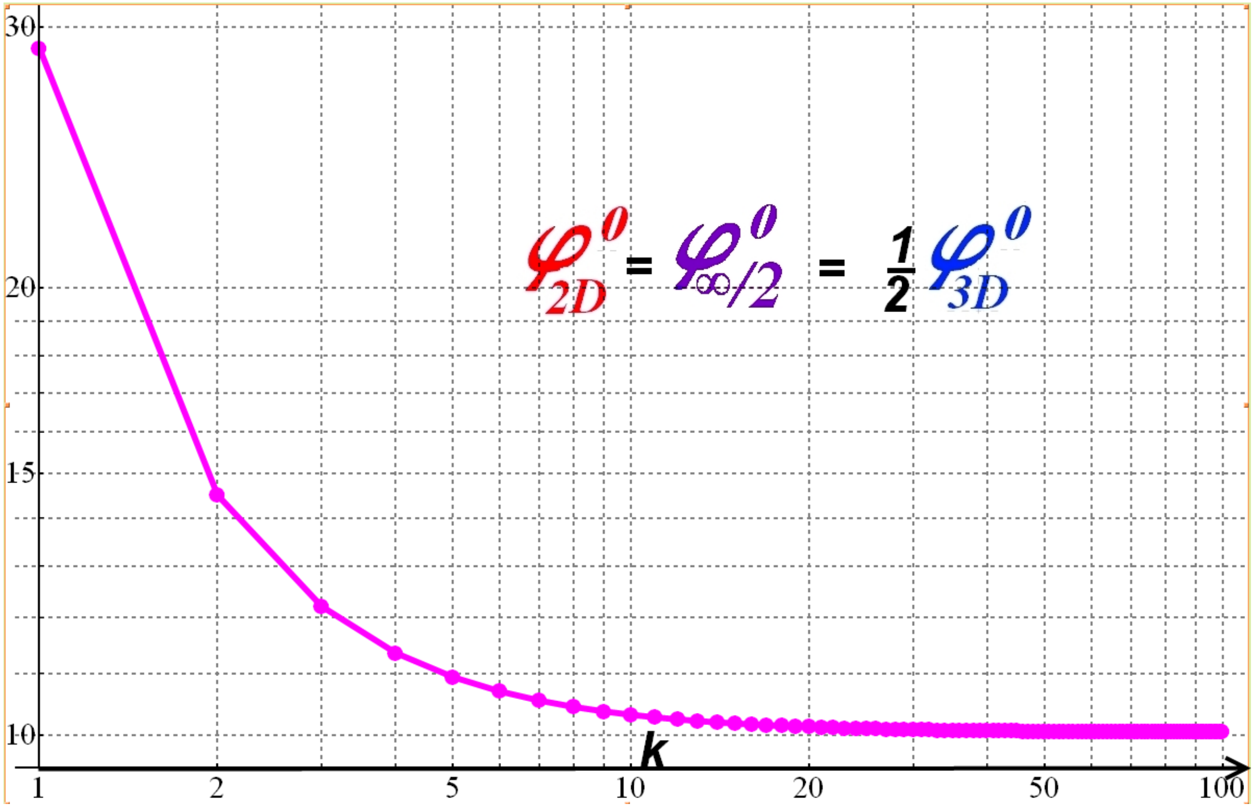

Fig. 5: Dependence of the Schottky barrier on the fold increase in the lattice spacing (decrease in the relative concentration of the centers of attraction).

So we have, as it were, the imposition of two initially abstracted phenomena: a limitation of the distribution of the potential of nuclei obtained independently of anything and the rise of the allowed state of an electron obtained for the potential distribution of an isolated atom. This is in principle a standard model for the formation of a conduction band, only for potential relief, and for calculating the allowed state of an electron in an isolated atom, it is necessary to take into account the true degree 1.676.

II. Gravitational Potentials in the Universe

Most of the modern problems of cosmology are artificial, far-fetched, since it evades the solution of the Main Problem: the finiteness of measured local quantities for an infinite Universe. Hiding the Main Problem, cosmologists even “measured” and weighed the infinite! The whole universe. But the values obtained by them characterize not the boundaries of the infinite Universe, but the boundaries of their sphere of knowledge about the power of infinite sets. Their experimental borders of "infinity" are less than the number of electrons in one cubic centimeter. And the theoretical boundaries of their sphere of knowledge, in fact, they set themselves arbitrariness in choosing the absolute value of energy. And when discussing about the far Cosmos, especially about the infinite Universe, it is simply impossible to do without using potential energy. In principle, the calculation of the true potential described above allows eliminating this uncertainty for the gravitational potential.

They are accustomed to counting electric energy. Every quantum is considered. Therefore, they use mainly potential diagrams. We will return to them when considering gravitational effects. But first, a little about the forces that are used in the near space and in electrical measurements. Despite the gigantic, by 40 orders of magnitude difference between the Coulomb force and the gravitational force [10, 11], a functional similarity of these two potential forces is observed. Therefore, we can compare the distribution of forces - derivatives of the previously obtained true potential Fi near the object boundary with the reduced Coulomb-Newton force FC-N near the same boundary. If we use the distribution of the true potential near the border shown in Fig. 3 for a semi-infinite crystal and its Coulomb approximation presented there, we obtain the distribution of these forces, shown in Fig. 6.

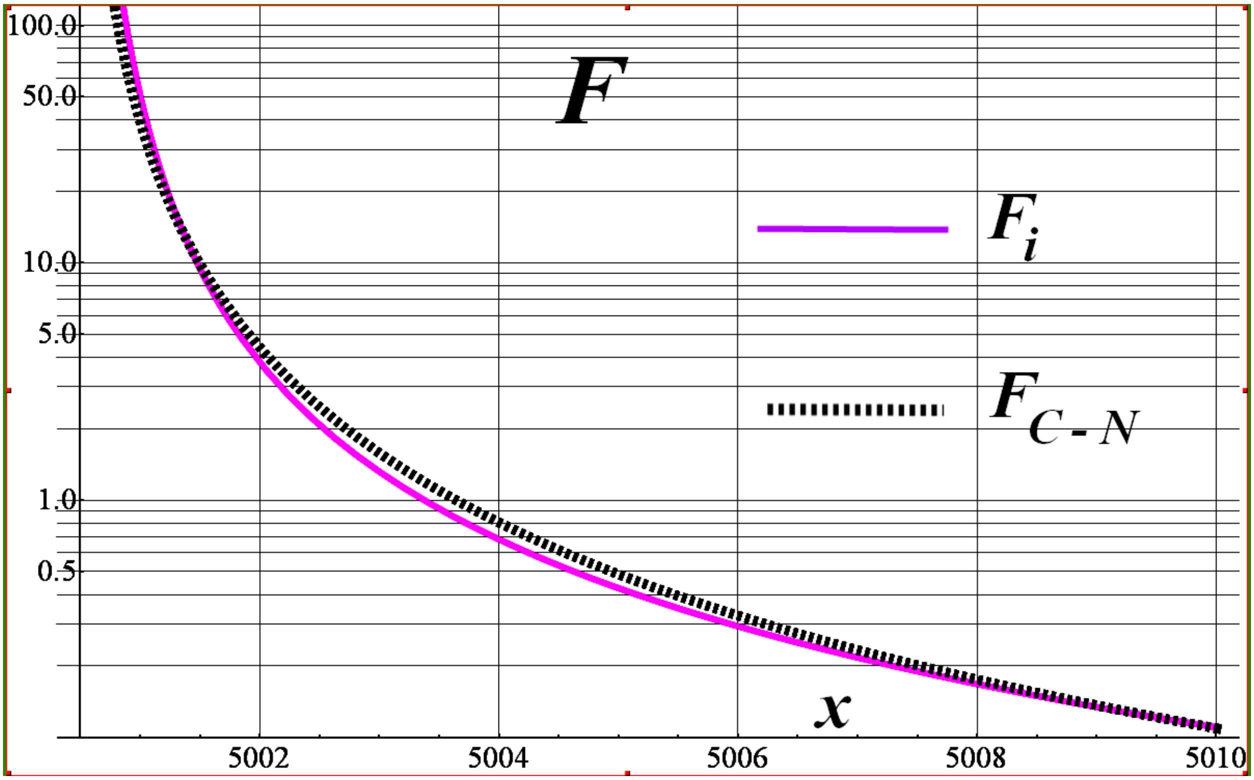

Fig. 6: The spatial distribution of the true force of attraction F_i on the boundary of the object and the Coulomb – Newtonian force F_{C-N}.

As can be seen from the figure, a substantial excess of the true force F_i corresponding to the Schottky effect over the F_{C-N} force begins immediately near the object boundary. The fact that these true forces are manifested in the form of the Van der Waals, when approaching a small distance of ideal flat boundaries, we have already mentioned above. The apparent contradiction with the macroscopic measurements of gravity near the surface of the Earth is due to the fact that the mass density of the Earth is unevenly distributed - it rises sharply to the center due to compression / pressure. But the principles of accounting for these "details" will be shown below. For now, returning to Fig. 6, we only note that for near space, the true potential gives only corrections to the Earth's space velocities. But the amendments are needed. People need to believe in something (at least in the resurrection of Christ, which they themselves crucified), but in science, to replace the "nonideality coefficient" of the theory with the "nonideality coefficient" of semiconductors, as in calculations of the current-voltage characteristics of p-n junction, is not good . So it is in gravity. As he told my friend Neil Am strong, returning to Earth from the Moon in automatic mode, they almost missed the Earth and hardly got to the Earth in manual mode.

But we will concentrate the main attention on the Basic Problem, which is rooted in the representation of the potential that actually controls all the electronics, something unreal to gravity. Although in the electrostatics itself in the above-mentioned works, problems were noted that can be fully attributed to gravitostatics [15]. Here we will not touch upon the problem [2] of the incorrect, contradicting the observable both micro and macro effects, application of the Ostrogradsky-Gauss theorem, which allegedly leads to a decrease in the electric field near the internal non-planar surface. Here we will touch on the problem of true potential raised in the previous paragraph, which is different from the zero Newton and Coulomb Law. It is his vibrations that give both electromagnetic and gravitational waves [15]. But we will not consider the dynamics with acceleration yet either, but we will use the mathematical expressions for the true potential already obtained in the previous section and the ideas about the work function and the conduction band, borrowed from Solid Physics Physics.

Already in the previous section, these ideas were implicitly corrected / refined by the charge-mass analogy [9]. Thus, the free motion of electrons above the potential barriers of atoms above the bottom of the conduction band is similar to the movement of asteroids "above the potential barriers" of planets and stars. If the asteroids do not fall exactly into an astronomical object, they will fly past it with energy conservation. Just as they approach, their potential energy will decrease with an equivalent increase in kinetic energy, and then their kinetic energy will decrease with potential energy reaching the previous level.

Already this ELEMENTARY example shows us that, both for charges and for the masses, the use of arbitrariness in choosing a constant for a potential is, to put it mildly, counterproductive. And if the ZERO potential at infinity is chosen, then the position of the DND of the conduction band, both for the charges and for the masses, is strictly defined - as shown in the previous figures.

But gravity also revealed issues that were thrown out of consideration in electrostatics (with an arbitrary potential constant) and were only noted in the previous paragraph. This is the question of Infinity (in particular, the Universe). Above was noted simply as a curious fact that the potential of the bottom of the conduction band (relative to vacuum at infinity) of a semi-infinite three-dimensional crystal is strictly equal to half the potential of the bottom of the conduction band of the infinite crystal. In fact, this potential is influenced by the power of an infinite set and putting together in the zero plane two semi-infinite crystals, it is quite natural (for border nodes and not quite familiar for nodes at infinity) that the height of the interstitial barrier is lowered exactly twice. So, the boundary cyclic Kronig-Penny conditions used for a long time in electrons for electrons (and not only) are correctly replaced by "contact" plus and minus infinity in calculations by "infinity". Specifically, in the calculations, they replace with sufficiently large numbers sufficient to reach the asymptotics of the calculated parameters. But, at the same time there is a new BUT! NO SURFACE BARRIER along the dimension in question! For the conventionally depicted one-dimensional case (Fig. 7), the ZERO at infinity can be taken for another orthogonal measurement- dimension. Showed in Fig.7.the distribution scheme of potential barriers of lattice sites works well in one-dimensional wires, both in terms of calculating kinetic parameters and in terms of matching the magnitude of the work function to another measurement of the depth of the conduction band along the wire (the experimental differences of the "work output" are quite understandable by different experimental conditions).

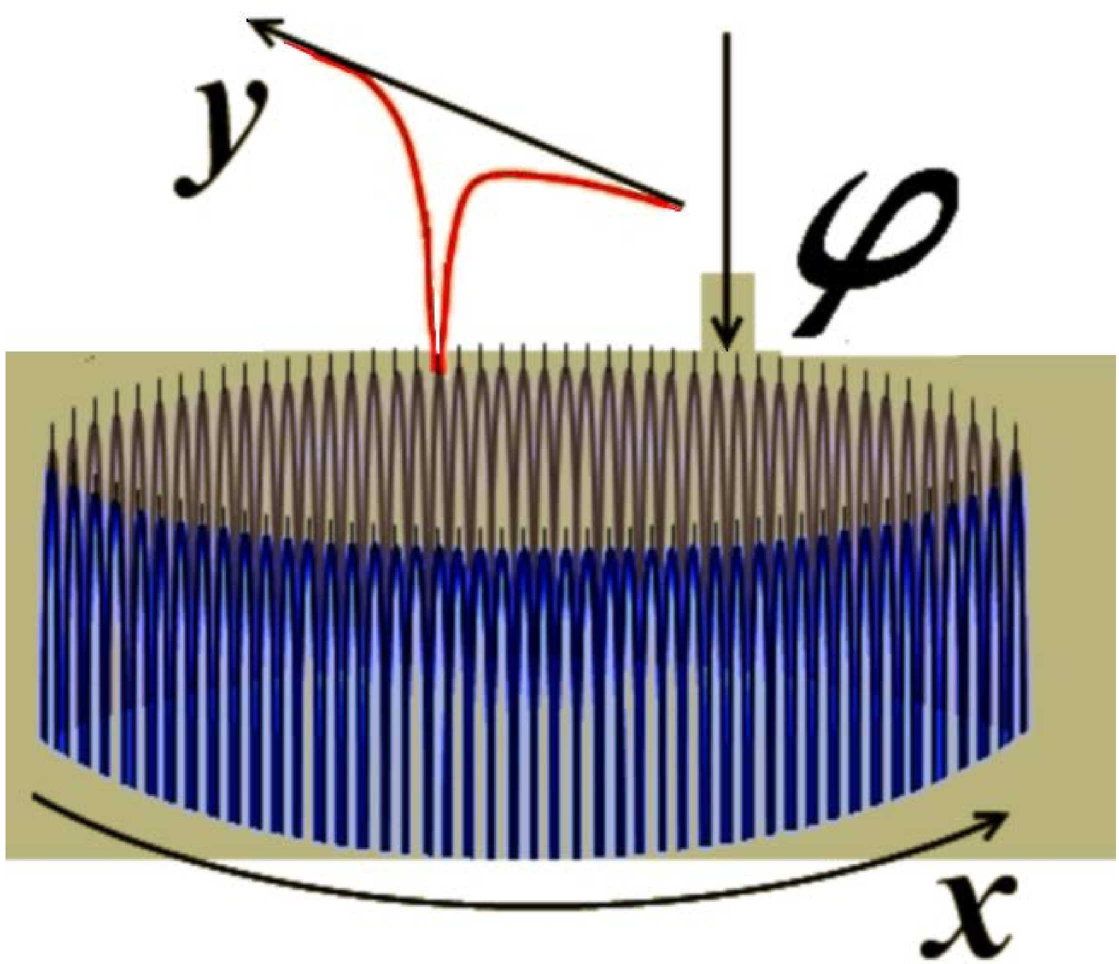

Fig. 7: Schematic representation of one-dimensional potential interstitial barriers for movement along x (blue curves below) under cyclic Kronig-Penney boundary conditions and the course of the surface potential in the direction orthogonal to the movement along y (red curve above)/

It is not difficult to construct a similar potential scheme for the two-dimensional case. And the orthogonal third dimension also confirms the operability of the Kronig-Penney conditions for two-dimensional films. The performance of these conditions has been repeatedly tested and used in Solid State Physics and in the three-dimensional case.

But in the Solid Body of "infinity" of one cubic centimeter there are real borders in all three dimensions, which allow checking the calculated values of the work function in experimental measurements (though, before specifying the Schottky barrier given in the previous paragraph, there were clever men who received "anisotropy" of work output, i. e., the orientation of the crystal changed ZERO in different directions at infinity!). And if we use the resulting true potential, then the false "anisotropy" of infinity for the charges goes away, and there are no fundamental contradictions in using the three-dimensional looping of the boundary conditions and for the three-dimensional truly infinite Universe. But, having no fourth geometric measurement, the only experimental verification is either the exit from three-dimensional space at energies greater than the Schottky barrier, or the exit to the asymptotic limit of the possible kinetic energies of a "particle" in the Universe.

This ideological question arises from the charge-mass similarity of potentials when considering gravity, but it also applies to the charge field in full. And his decision was hampered by arbitrariness in the choice of a potential constant, even electric, which led to errors / confusion. Whereas the finiteness of the measured values of the macroscopic characteristics is determined by the finite depth of the potential barrier relative to infinity - that is, the output at infinity to the zero derivative of the potential is zero Force!

As was shown in [16], for charge and mass, not only the zero, Newton-Coulomb static laws, but also the dynamic laws are similar. This allowed to look at the problem of the stability of the Universe from the other side. If once the planetary model helped to understand the structure of the atom, now many well-advanced theoretical models of a solid body solve the problems of the Universe that are "unsolvable" by the most modern mathematical methods. Both static and dynamic. In particular, the properties of an electron in an "infinite" crystal are well described (taking into account what was stated in the previous paragraph) by the final parameters due to the Carnot cyclic conditions. This allows you to remove the full arbitrariness in the choice of the potential of the constant not only, as was done above, for the charge (and bring it in line with the experimental data in the crystals), but also for the infinite Universe.

The fields we measure and the dynamics of material bodies are determined by a combination of an infinite number of sources of fields in the Universe. I mean, we measure the effective fields and masses / charges. And the fundamental difference of measurements in the "infinite crystal" and the infinite Universe in that, in the crystal, we "look", say, on an electron, through the border - we apply and take into account external fields, whereas, being in the Universe, measuring the properties at a distance from the source fields (local) we must take into account the internal field.

So the similarity of the Law of the World and Coulomb's Law, given the huge difference in the absolute value of their forces, is associated with geometrically different scales - instead of Angstroms, the Parsecs. And the correction in these Laws of degree - instead of the constant unit variable from 1.676 to zero, allows this similarity to be used to determine the finite values of environmental parameters in an infinite Universe.

To conclude this article, let's talk a little bit about the "details".

The chaotic distribution of stars in space does not match the ideal lattice. But to qualitatively show the absence of "bad" infinities, to show what the "resolved" potential in the "empty" place of the Infinite Universe is, allows the lattice of gravitational masses that are far apart in space. As shown in Fig.5. and this gas gives not zeros and bad infinities, but a qualitative conclusion about the finite value of the depth of the zone, even with an abstract tendency to discharge to infinity. Those absolute emptiness is also unattainable as absolute temperature zero.

As an example, we consider the distribution of the true potential for a finite package of fairly long 200 objects (Fig. 8)

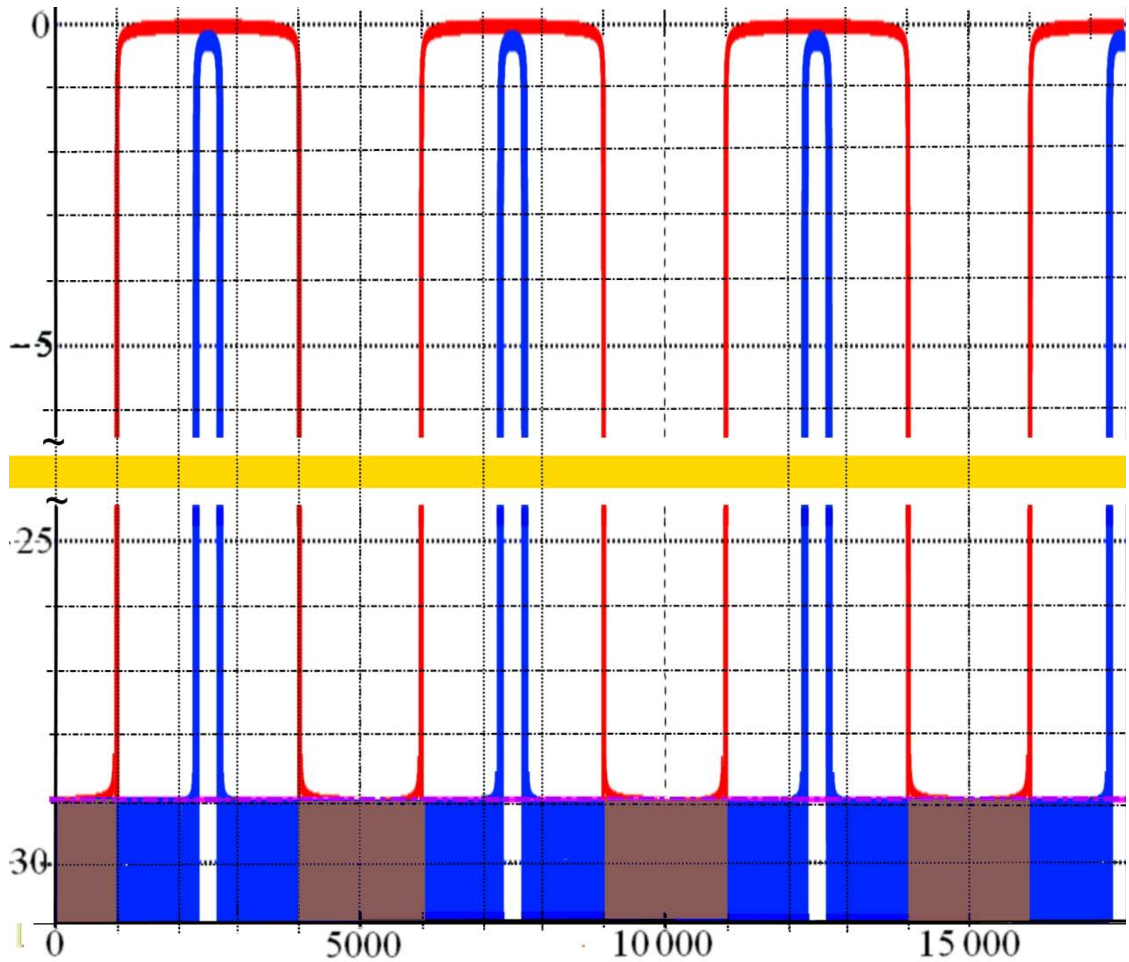

Fig. 8: The spatial distribution of the potential for central packages having a thickness less than (2000 layers) and more (4600 layers) half the distance between the packages (5000)

The potential distribution shown in Fig. 8 is described by the expression:

$$-\pi \sum_{k=-100}^{100} \left(\sum_{n=5000k-1000}^{5000k+1000} \left(\frac{1}{Abs\left[x-(n+0.5)\right]} \right)^{1.676} \right), \qquad (8)$$

$$-\pi \sum_{k=-100}^{100} \left(\sum_{n=5000k-2300}^{5000k+2300} \left(\frac{1}{Abs\left[x-(n+0.5)\right]} \right)^{1.676} \right)$$

The dependences shown in Fig. 8 allow us to determine the final depth of the bottom of the CONDUCTIVITY ZONE for crystals (when using / taking into account charges), and! for SPACE (when using / accounting for masses of bodies).

III. Conclusion

For any potential forces, although electrostatic, even gravitational, it is necessary by law to reduce their potentials in inverse proportion to the distance from the object: charge or mass. However, in a large dynamic range, this LAW was not experimentally verified, but was limited to using them as an approximation of measurement results and for qualitative assessments.

The reason for this was that the LAW was allegedly "clearly confirmed" by a decrease in the "power flux density" through a given surface covering an object in inverse proportion to the surface area. However, this “visibility” did not rely in any way on the actually observed “Particles of Flowing Force”, which infinite time “flowed out of the object, but did not end at all (and did not return).

So this law was simply postulated, purely phenomenologically. But at the same time, a new LAW of short-range forces between charges was introduced purely empirically for small distances, in which, with reference to symmetry, it was assumed that the potential decreases with a distance of third or fourth degree. Such a rough fit with the help of "fundamental forces" has long been learned how to obtain final parameters in an "infinite crystal, associating them with the Schottky barrier and the work function and using them for a long time in practice when designing devices. But in cosmology, similar calculations were not carried out, and the gravitational potential was addressed “freely” up to a constant, even infinite. It was not necessary to design the cosmos, but with the flight of rockets into space, the “difficulties” of calculating the trajectory were corrected with the help of numerous adjustments of the flight trajectory.

The obtained phenomenological LAW 1.676 and the used method of calculating the total potentials made it possible to translate both electrical and gravitational "anomalies" into the discharge of normal counted effects. And the analysis of the LAW 1.676 itself allows us to obtain a quantitative ratio between the gravitational and inertial mass (charge), the equivalence of which was qualitatively postulated by Einstein.

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Global Journal of Science Frontier Research (A) Volume XIX Issue IV Version I Year 2019

Global Journal of Science Frontier Research: A
Physics and Space Science
Volume 19 Issue 4 Version 1.0 Year 2019
Type : Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4626 & Print ISSN: 0975-5896

Retscreen Analysis of Solar Energy Project in Lafiagi, Kwara State, Nigeria

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Abstract- This paper examines studies to evaluate the economic viability of off-grid photovoltaic PV renewable energy technologies for rural applications in Lafiagi, Kwara State, Nigeria, to meet the government set target. It utilizes the life-cycle cost to estimate a 25 years life-time of an off-grid electrification project and compare with the cost of paying for grid-electrification within the same period. The result shows that such a project is economically viable. The project yield a strong positive pre-tax IRR on equity and a positive pre-tax IRR on assets. A simple payback can only be guaranteed in the project life span. Meanwhile, an equity payback can be completed within 12 years of the project life cycle.

Keywords: *off-grid electrification, photovoltaic panel, viability, assets, equity and IRR.*

GJSFR-A Classification: *FOR Code: 020109*

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Strictly as per the compliance and regulations of:

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I. Introduction

Developing countries have strongly expanded their power sectors during the last three decades. However, more than two billion people living in rural areas still surfer the choice of grid-based electricity service. Given the high cost of grid extension to utilities throughout the developing world, progress in expanding electricity service to served rural areas remains slower than population growth (Lensen, 1993). Off-grid renewable energy system represent an important option for the reducing the electricity gap in rural parts for developing world.

The lack of access to electricity poses a substantial barriers to achieving the millennium development goals (MDGs). For example, to achieve universal primary education, educational facilities need electricity for teaching aids and good lighting for reading in homes; to reduce child mortalities and improve maternal health, health facilities need refrigerators to store drugs, vaccines and electricity for proper lighting and effective service delivery. Studies have shown that there is a high correlation between annual per capital electricity consumption and human development index (Meisen and Akin, 2008). The situation is nor different in Nigeria. In 2009, about 50.6% of Nigerians lacked access to electricity (IEA, 2011), although at the different geopolitical zones, the situation is significantly different.

World Bank (2011) notes that off-grid electrification is usually considered when providing electricity access to small, low-income rural communities far from the existing grid, with discrete settlement pattern. Foley (1990) listed the gains of off-grid electrification to included pumping of water in the village, heating, lighting and cooking which provides the necessities of life to these rural dwellers. Different technical options can be considered in executing off-grid models (Kerridge *et al.,* 2008; Bhattacharyya, 2012). The use of each technology depends on the domestic resources available. Communities with solar radiation will likely use solar energy while communities closer to a river will prefer the use of mini hydroelectric project.

Some studies consider the viability of off-grid electrification using solar PV panels in a hybrid mix, usually with a back- up diesel engine (Shaadid and Elhadidy, 2008). However, because of high cost of diesel and greenhouse gases emission, the study will not consider the hybrid solar PV/Diesel option. Several studies have been conducted to determine the feasibility, viability and risk involvement in implementing off-grid electrification. Sanneh and Hu (2009) analysed the use of solar PV in lighting rural and peri- urban homes in Gambia. They identified different methods of financing the project. Rehman *et al.,* (2007) used RET Screen to analyses the cost of generating electricity using PV panels in locations having different average solar radiation levels in Saudi Arabia. Mirzahosseini and Taheri (2012) study the environmental, technical and financial study of solar power plant in Iran using RET Screen. Three different scenario were considered based on the electricity tariff in Iran and the result showed a positive cash flow where credit was obtained by reducing greenhouse gases and the electricity tariff is 175cent/KWh. Akpan (2012) access the off-grid electrification in Nguru, Nigeria using solar PV. The study developed four scenarios. The result of the first scenario indicates positive net present value and annual life-cycle saving of $2839 and $266/yr respectively. In the second scenario, the viability of the project increases where there is a government start-up grant to cover a percentage of the initial total cost. Third and the fourth scenario showed a good project viability where the cost of the solar panel reduces. This paper presents the feasibility and greenhouse emission analyses of off-grid electrification using RET Screen software of Natural Resources Canada and the data of National Aeronautic and space Administration (NASA) for a household in Lafiagi, Kwara state, Nigeria.

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II. METHODOLGY

a) *Study Location*

The location for this research is Lafiagi, Kwara state, in the west central Nigeria on the south bank of the Niger River. It has a latitude 8.9^0 and longitude 5.4^0 with an average annual solar radiation of 5.29 KW/m^2/d (Table 1). The major criterion for selection was the availability of meteorological data for the location. Meteorological data for this location was obtained through RET Screen software from NASA. It is a market Centre for rice, yams, sorghum, millet, corn (maize), sugarcane, kola nuts, peanuts (groundnuts), palm produce, fish, cattle, and cotton The town is also a collecting point for the rice grown on the fadamas ("floodplains") of the Niger and for dried fish. Cotton and tobacco are local cash crops, and cotton weaving is traditionally important. Lafiagi has a government maternity clinic and dispensary population. The Map of Lafiagi is shown in figure 1. The energy needs by household in this community are mainly for cooking, where about 97.7% is gotten from fuel wood (NBS, 2009): lighting, where kerosene is the major source; and agricultural activities and water pumping, which are usually done manually (Chikaire et al., 2011).

(Source: Encyclopedia Britannica)

Figure 1: Map of Lafiagi

Table 1: Annual Climate date for Lafiagi, Nigeria

	Unit	Climate data location	Project location
Latitude	°N	8.9	8.9
Longitude	°E	5.4	5.4
Elevation	m	240	240
Heating design temperature	°C	20.0	
Cooling design temperature	°C	33.1	
Earth temperature amplitude	°C	12.9	

Month		Air temperature	Relative humidity	Daily solar radiation - horizontal	Atmospheric pressure	Wind speed	Earth temperature	Heating degree-days	Cooling degree-days
		°C	%	kWh/m²/d	kPa	m/s	°C	°C-d	°C-d
January		27.1	38.2%	5.74	98.1	2.4	29.9	0	531
February		27.5	46.1%	5.91	98.1	2.4	30.4	0	490
March		26.9	67.7%	6.01	98.0	2.6	29.1	0	525
April		26.3	78.5%	5.78	98.0	2.5	27.6	0	489
May		25.9	81.4%	5.43	98.1	2.2	26.8	0	492
June		24.9	83.8%	4.92	98.3	2.1	25.6	0	448
July		24.1	84.1%	4.44	98.4	2.2	24.6	0	437
August		24.0	83.5%	4.26	98.4	2.2	24.6	0	434
September		24.4	84.0%	4.55	98.3	2.0	25.1	0	432
October		24.7	81.3%	5.12	98.2	1.9	25.5	0	457
November		25.4	68.9%	5.72	98.1	2.2	26.7	0	462
December		26.4	46.3%	5.67	98.1	2.2	28.5	0	509
Annual		25.6	70.4%	5.29	98.2	2.2	27.0	0	5,705
Measured at	m					10.0	0.0		

Source: RETScreen software

b) RET Screen Software

The RET Screen 4 International Clean Energy Project Analysis Software is an innovative energy alertness, decision support and capacity building tool. It is managed under the leadership and ongoing financial support of CANMET ENERGY research Centre of Natural Resources Canada's NRCan. RET Screen is developed in collaboration with a number of other governmental and multilateral organizations, and with technical support from large network of specialists from industry, government and academia, such as NASA, REEEP, UNEP, DTIE, GEF, SWERA, PCF, EEF, WB andLeonardo ENERGY Initiative. (RET Screen, 2005). The first version of the RET Screen software was released in May 1998. Since then, it has become the most popular and widely used RE feasibility analysis software in the world. (RET Screen, 2005). RET Screen is the most comprehensive product of its kind, allowing engineers, architects, and financial planners to model and analyze any clean energy project. Decision-makers can conduct a five step standard analysis, including energy analysis, cost analysis, emission analysis, financial analysis, and sensitivity/risk analysis. The technologies included in RET Screen's project models are all-inclusive, and include both traditional and non-traditional sources of clean energy as well as conventional energy sources and technologies.

c) Specification for Energy Model Worksheet

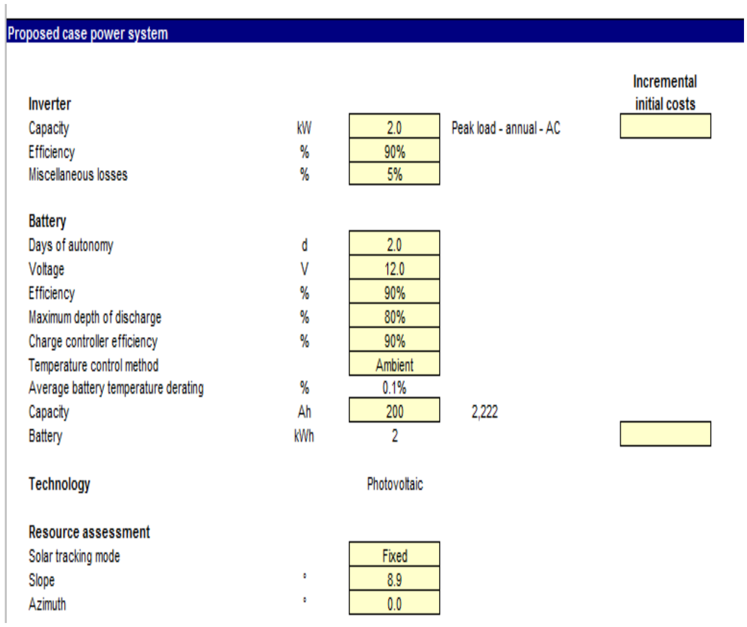
Introduction of electricity in to rural community will lead to steady switching of energy sources for both household and commercial use. For household energy use, it is expected that the source of lighting will gradually shift from kerosene lamps to modern energy-saving electric bulbs. (IEA, 2011). In addition, the demand for electricity for productive uses will be created, and electricity will also be needed for other uses that improve the living standard of the people e.g. pumping water and in health facilities. This study employs the life cycle approach to estimate the lifecycle of an off-grid electrification project using solar PV panel and compare it with the cost of paying for grid-electricity [₦16.11/KWh]. As the life span of modern solar PV panels is between 20 and 30 years, the research assumes the project life of 25 years (Table 2). Within these year, the demand for electricity is expected to increase gradually. This is done for three inter-related reasons:

i. The need to ensure effective capacity utilization to curb energy wastage;
ii. Solar PV panels are modular so increasing the generating capacity of the project to meet an increasing demand will not be difficult;
iii. And the cost of solar panels is decreasing steadily so it will be cheaper to add additional capacity in the future to meet increasing demand.

Table 2: The load specification analysis

Description	AC/DC	Intermittent resource-load correlation	Base case load W	Hours of use per day h/d	Days of use per week d/w	Proposed case load reduction %	Proposed case usage time reduction %
5*15W*LCD BULB*1 HOUSEHOLD	AC	Negative	75.00	7.00	7	1%	1%
2*50W*STANDING FAN*1 HOUSEHOLD	AC	Negative	100.00	5.00	7	1%	1%
1*50W*TV*1 HOUSEHOLD	AC	Negative	50.00	5.00	7	1%	1%
1*40W*RADIO SET*1 HOUSEHOLD	AC	Negative	40.00	1.00	7	1%	1%
1*DVD*40W*1 HOUSEHOLD	AC	Negative	40.00	5.00	7	1%	1%
1*750W*REFRIGERATION*1 HOUSEHOLD	AC	Negative	750.00	8.00	7	1%	1%
1*350W*OTHERS*1 HOUSEHOLD	AC	Negative	350.00	5.00	7	1%	1%

The capacity of the inverter used is 2kW, with 90% efficiency and 5% miscellaneous loss. Similarly, the study uses a 12V,200Ah battery, with 90% efficiency, 80% maximum depth of discharge, 90% charge controller efficiency, and 2 days of autonomy. The tracking mode of the solar panels is assumed to be fixed at a slope of 8.9^0 and azimuth of 0.0^0. Furthermore, the research uses a mono-silicon photovoltaic panel manufactured by Sungen (model: mono-Si -SGM-160D; power capacity: 130W) and assumes a maximum point tracker control method (Figure 2).



(Source: RETScreen International.)

Figure 2: RET Screen Energy Model sheet

d) Specification for Financial Worksheet

This study uses the Nigerian average monthly inflation rate for 2015 of 9.0% (CBN, 2015) with a loan term of 20 years at an interest rate of 13%. Additionally, the study uses a discount rate of 8% and a fuel cost escalation rate of 6%.

In this research, the analysis was carried out to determine the ability of the potential projects to earn income and sustain an economic growth for a 25 year project analysis period. This was done using the RETScreen software which facilitates the project evaluation process with its financial parameters input items (e.g. discount rate, debt ratio, etc.), and its calculated financial viability output items (e.g. Internal rate of return IRR, simple payback, etc.). The following financial parameters were used for the solar energy resource analysis.

Table 3: Financial parameters with solar financial analysis

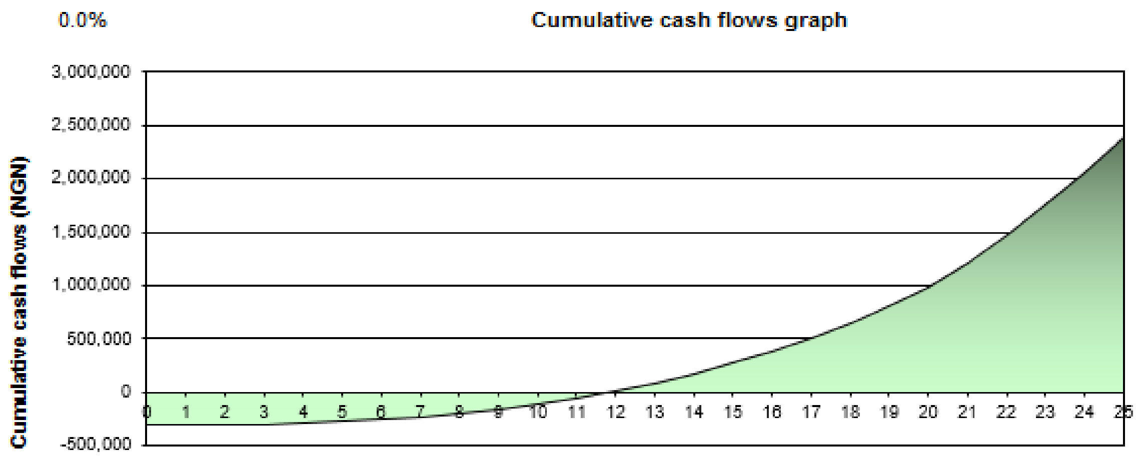
Financial parameters Units Value used Description
Inflation rate%9.0Projected annual average rate of inflation over the life of the project.
Project lifeYr25Duration over which the financial viability of the project is evaluated
Debt ratio% 50 Reflects the financial leverage created for a project
Debt interest rate% 13 Annual rate of interest paid to the debt holder at the end of each year of the term of debt.
Debt termYr20Number of the years over which the debt is repaid.
INITIAL COSTS
Power system (83.9%)NAIRA₦520, 180.00Cost of the proposed power system.
Other (16.1%)NAIRA₦99,820.00Other cost such as installation etc
Total initial costs (100%)NAIRA₦620,000.00Complete cost to purchase, transport and install equipment.
Incentives and grantsNAIRA0.00Any contribution, grant, subsidy, etc, that is paid for the initial cost (excluding credits) of the project.

Annual costs and debt payments
O and M (savings) costsNAIRA0.00Annual operation and maintenance costs
Fuel cost – proposed caseNAIRA₦18,614.00
Debt payments – 20yrsNAIRA₦44,130.00Annual amount paid for the debt
TOTAL ANNUAL COSTSNAIRA₦62,744.00Total annual expenditures
Annual savings and income
Fuel cost – base caseNAIRA₦57,480.00
Total Annual savings and income₦57,480.00

III. Result And Discussion

a) Financial Analysis

Figure 3 shows the cumulative cash flow for solar energy project in Lafiagi, Nigeria.



(Source: RETScreen International)

Figure 3: Cumulative cash flow graph

RET Screen uses the above financial parameter alongside with the energy generated per year to access the financial viability for Lafiagi, Nigeria and the following result is obtained:

Table 4: Financial viability analysis

Financial viability Unit
Pre – tax IRR – equity%13.2%
Pre – tax IRR – assets%8.4%
Simple paybackYr16.0
Equity payback Yr11.8 (< than the project)

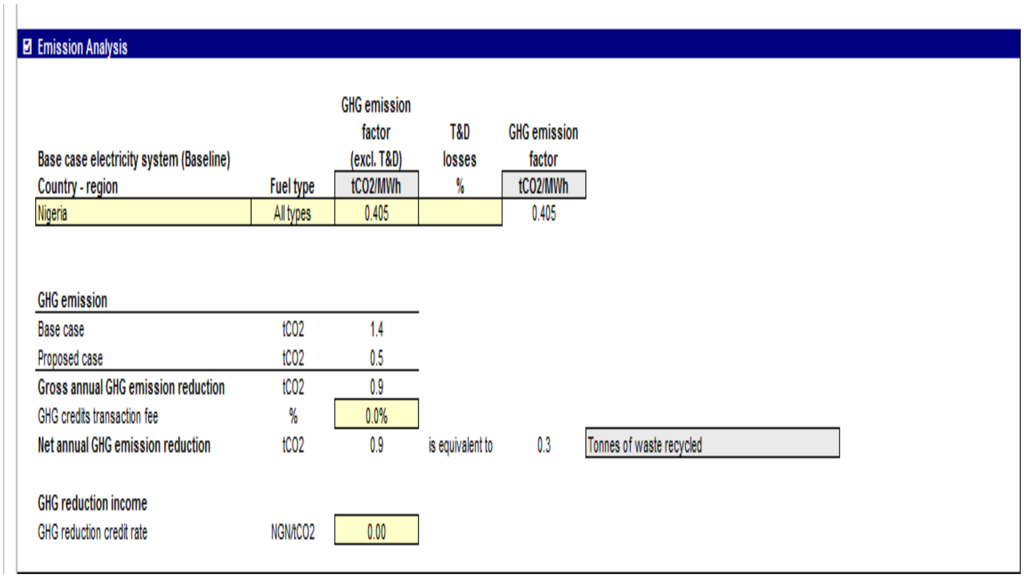
Source: RETScreen international

The Financial analysis for Lafiagi in Kwara State yielded a strong positive pre-tax IRR on equity and a positive pre-tax IRR on assets as shown in table 4. Such a result indicates that the project would be economically viable for commercial purposes. A simple debt payback can only be guaranteed in the project life span, whereas an equity payback can be completed within 12 years of the project life cycle. This shows that the equity payback is less than the project life which means the project will also be financially viable.

IV. Emission/Environmental Analysis

The environmental analysis seeks to assess the emission offsets in the environment that can be achieved through the use of renewable energy instead of conventional fossil fuel. RETScreen looks at the most current documented rates of emissions for electricity generation and other sources for Nigeria, mainly the emission of Green House Gases (GHG). Furthermore, it brings out the best use of renewable energy in terms of minimizing CO2 and other pollutants. Similar analysis were done for the solar resources. Figure 4 showed that the potential for environmental protection by offsetting GHG emissions by solar energy projects assessed in this research was very small. The reason for this is that RETScreen's calculation is based on a GHG emission factor with (0.045) or without (0.039) TandD losses per MWh of electricity generated.

Emission analysis for solar energy across the entire nation was not convincing with most of the areas giving an approximate value of 1.5t/CO2/yr.



Source: RETScreen International

Figure 4: Emission analysis

Because the results of the emission analysis were similar and only differed slightly in terms of amount of gasoline not consumed and others, certain results were summarized and presented in Table 5.

Table 5: Greenhouse Gases offsets by solar in Lafiagi, Nigeria

Greenhouse gases description CO_2 Equivalent value
Electricity exported to grid kWh/yr
GHG emission reduction (tCO_2/yr)0.90.9
Net GHG emission reduction (tCO_2/yr)0.90.9
Cars and light trucks not used0.90.2
Litres of gasoline not consumed0.9387
Barrels of crude oil not consumed0.92.1
People reducing energy consumption by 20%0.90.9
Acres of forest land absorbing carbon dioxide0.90.2
Hectares of forest absorbing carbon dioxide0.90.1
Tonnes of waste recycled0.90.3

V. Conclusion

Based on the government's target of ensuring 80% electricity coverage in Nigeria, this study examined the viability of using solar photovoltaic panels in a decentralized off grid electrification project for a typical rural community in Kwara state, Nigeria. The study compare the total cost of providing electricity using solar PV panels for 20 years with initial electricity load of 1.5KW with that of paying electricity tariff assuming grid connection is ascertained. The result shows that the project is economically viable at the usual commercial interest rate.

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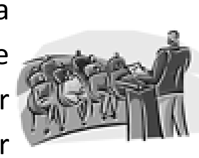

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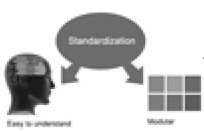

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The MARSS member can apply for approval, grading and certification of standards of their educational and Institutional Degrees to Open Association of Research, Society U.S.A.

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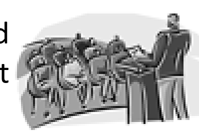
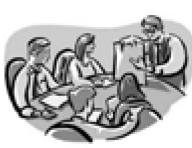
The author fees of such paper may be waived off up to 40%.



The Global Journals Incorporation (USA) at its discretion can also refer double blind peer reviewed paper at their end to the board for the verification and to get recommendation for final stage of acceptance of publication.



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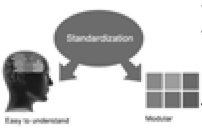

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The board can also take up the additional allied activities for betterment after our consultation.

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Note :

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g) Suitable statistical data should also be given.
h) All data must have been gathered with attention to numerical detail in the planning stage.

Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

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1. Choosing the topic: In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

2. Think like evaluators: If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

3. Ask your guides: If you are having any difficulty with your research, then do not hesitate to share your difficulty with your guide (if you have one). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work, then ask your supervisor to help you with an alternative. He or she might also provide you with a list of essential readings.

4. Use of computer is recommended: As you are doing research in the field of science frontier then this point is quite obvious. Use right software: Always use good quality software packages. If you are not capable of judging good software, then you can lose the quality of your paper unknowingly. There are various programs available to help you which you can get through the internet.

5. Use the internet for help: An excellent start for your paper is using Google. It is a wondrous search engine, where you can have your doubts resolved. You may also read some answers for the frequent question of how to write your research paper or find a model research paper. You can download books from the internet. If you have all the required books, place importance on reading, selecting, and analyzing the specified information. Then sketch out your research paper. Use big pictures: You may use encyclopedias like Wikipedia to get pictures with the best resolution. At Global Journals, you should strictly follow here.

6. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right? It is a good habit which helps to not lose your continuity. You should always use bookmarks while searching on the internet also, which will make your search easier.

7. Revise what you wrote: When you write anything, always read it, summarize it, and then finalize it.

8. Make every effort: Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

9. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several unnecessary diagrams will degrade the quality of your paper by creating a hodgepodge. So always try to include diagrams which were made by you to improve the readability of your paper. Use of direct quotes: When you do research relevant to literature, history, or current affairs, then use of quotes becomes essential, but if the study is relevant to science, use of quotes is not preferable.

10. Use proper verb tense: Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

11. Pick a good study spot: Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.

Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. Arrangement of information: Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

19. Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

20. *Think technically:* Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

21. *Adding unnecessary information:* Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

22. *Report concluded results:* Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

23. *Upon conclusion:* Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.

Mistakes to avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.
- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- o Single section and succinct.
- o An outline of the job done is always written in past tense.
- o Concentrate on shortening results—limit background information to a verdict or two.
- o Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.

Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

Procedures (methods and materials):

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.

Content:

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."

Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

The Administration Rules

Administration Rules to Be Strictly Followed before Submitting Your Research Paper to Global Journals Inc.

Please read the following rules and regulations carefully before submitting your research paper to Global Journals Inc. to avoid rejection.

Segment draft and final research paper: You have to strictly follow the template of a research paper, failing which your paper may get rejected. You are expected to write each part of the paper wholly on your own. The peer reviewers need to identify your own perspective of the concepts in your own terms. Please do not extract straight from any other source, and do not rephrase someone else's analysis. Do not allow anyone else to proofread your manuscript.

Written material: You may discuss this with your guides and key sources. Do not copy anyone else's paper, even if this is only imitation, otherwise it will be rejected on the grounds of plagiarism, which is illegal. Various methods to avoid plagiarism are strictly applied by us to every paper, and, if found guilty, you may be blacklisted, which could affect your career adversely. To guard yourself and others from possible illegal use, please do not permit anyone to use or even read your paper and file.

Criterion for Grading a Research Paper (Compilation) by Global Journals

Please note that following table is only a Grading of "Paper Compilation" and not on "Performed/Stated Research" whose grading solely depends on Individual Assigned Peer Reviewer and Editorial Board Member. These can be available only on request and after decision of Paper. This report will be the property of Global Journals.

Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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ISSN 9755896