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

Global Journal

of Science Frontier Research: A

Physics and Space Science

Wave Engine with Internal Energy

Consciousness Reality Hypothesis

Highlights

Empirical & Theoretical Validation

Computational Unified Field Theory

Discovering Thoughts, Inventing Future

VOLUME 18 ISSUE 7 VERSION 1.0

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Volume 18 Issue 7 (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

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945th Concord Streets,
Framingham Massachusetts Pin: 01701,
United States of America
USA Toll Free: +001-888-839-7392
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Offset Typesetting

Global Journals Incorporated
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Packaging & Continental Dispatching

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Contents of the Issue

Global Journal of Science Frontier Research: a
Physics and Space Science
Volume 18 Issue 7 Version 1.0 Year 2018
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4626 & Print ISSN: 0975-5896

The "Non-Continuous Universal Consciousness Reality Hypothesis" (NCUCRH) of the Computational Unified Field Theory (CUFT): Empirical & Theoretical Validation

By Jehonathan Bentwich, Ph.D.

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GJSFR-A Classification: *FOR Code: 240201p*

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I. Introduction

Twenty-first century Theoretical Physics is undergoing a major "Paradigmatic-Shift" – i.e., from the Old 'Material-Causal' Paradigm underlying Relativity Theory (RT) and Quantum Mechanics (QM) to the New 'A-Causal Computation' (ACC) Paradigm of the 'Computational Unified Field Theory' (CUFT). This Paradigmatic Shift is warranted based on the fulfillment of a few stringent criteria postulated by Thomas Kuhn (1962) as the necessary prerequisites for such a 'Paradigmatic Shift', including:

a) A principle theoretical inconsistency between the two primary pillars of 20th century Physics, namely: RT & QM.

b) An inability to account for up to 85% of all known "mass" and "energy" in the universe, e.g., due to the accelerated expansion of the physical universe that is currently explained based purely hypothetical "dark-matter" and "dark-energy" theoretical concepts but which cannot be observed empirically).

c) An identification of the CUFT's new 'ACC' Paradigm which has been shown capable of resolving this apparent RT-QM "theoretical inconsistency", as well as account for the accelerated expansion of the physical universe (e.g., based on the discovery of a singular higher-ordered 'Universal Computational Principle' – thereby discarding the purely hypothetical 'dark-matter'/'dark-energy' concepts as "superfluous, i.e., "non-existent"!)

d) The capacity of this New CUFT's 'A-Causal Computation' Paradigm to replicate- embed- integrate- and transcend the Old Paradigm's RT & QM Models: indicating the complete integration of the four basic physical features of "space", "time", "energy" and "mass" within a singular (higher-ordered) "Universal Computational Formula", which also completely integrates, embeds and transcends RT and QM;

e) The identification of particular 'critical-predictions' differentiating the New CUFT's 'ACC' Paradigm from the Old RT/QM 'Material-Causal' Paradigm's predictions; accompanied by an initial empirical validation of at least one such 'critical prediction' of the ACC Paradigm as more valid than the corresponding predictions of RT/QM; A n additional series of such 'critical-predictions' differentiating the CUFT's ACC Paradigm from RT/QM 'Material-Causal' Paradigm are described in the current article (and previously) which can be tested experimentally.

f) The discovery of an entirely new broader "Theoretical Horizons" associated with the discovery of the CUFT's ACC new realization that the every exhaustive spatial pixel comprising the entire

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physical universe is being simultaneously computed- "dissolved" and "re-computed"- and "evolved"- by the singular (higher-ordered) Universal Computational Principle (UCP) at the incredible rate of "$c^2/h" = 1.45^{-42}$ sec'! is continuously being computed

The scope and purpose of the current article is to evince- and experimentally outline- one of the potentially far reaching theoretical implications of this new CUFT's ACC Paradigm, namely: that the physical universe may not exist "continuously" – but rather, that every exhaustive spatial pixel constituting this physical universe is being computed (simultaneously) by a singular (higher-ordered) "Universal Computational Principle" (UCP) at every minimal time-point "$c^2/h"=1.45^{-42}$ sec', comprising an extremely rapid series of "Universal Simultaneous Computational Frames" (USCF's) of the physical universe! According to this new CUFT 'A-Causal Computation' (ACC) Paradigm the singular (higher-ordered) UCP simultaneously computes every exhaustive spatial pixel in the universe (giving rise to the extremely rapid "$c^2/h"=1.45^{-42}$ sec' USCF's frames), wherein "in-between" any two consecutive USCF's frames the entire physical universe "dissolves" back into the singular… Therefore, according to this new CUFT ACC Paradigm, the physical universe does not exist "continuously", but rather is computed- "dissolved"- recomputed- and evolved- by the UCP (at the incredible rate of "$c^2/h"=1.45^{-42}$ sec'. This means that according to the New 'A-Causal Computation' (ACC) Paradigm the physical universe *does not exist continuously, but is rather being created- "dissolved"- re-computed- and evolved- solely based on the singularity of the UCP's computation of every exhaustive spatial pixel in the universe with each successive USCF's frame/s it computes.*

Therefore, this article sets to outline and define the experimental means for testing a series of CUFT's "critical-predictions" which clearly differentiate it from the corresponding predictions of both RT and QM; Specifically, an initial indirect empirical validation of one of the CUFT's 'critical predictions', e.g., regarding its (new) computational definition of "mass" – as the degree of "spatial-consistency" of any given particle across a series of UF's was given through the (otherwise "unexplained") "Proton-Radius Puzzle" (Bernauer & Pohl, 2014);Indeed, the 'Proton-Radius Puzzle' refers to the unexplained subatomic measurements of two (equivalent) Hydrogen Proton radius – i.e., with the Proton Radius of a (standard) Hydrogen Atom (including an 'electron' particle) being 100 approximately times larger than the Proton Radius of an equivalent Hydrogen Atom in which the 'electron' particle was replaced by an equivalently negatively charged "Muon" particle, which possesses a mass that is approximately 100 times more massive than the 'electron' particle!? Despite the fact that in the case of the 'Muon' Hydrogen Atom the Muon "sunk" into the Nucleus – there is no available explanation for its Proton Radius decreasing 100 times relatively to the standard Hydrogen Atom (with the equivalently negatively charged 'electron' particle), according to either Relativity Theory or Quantum Mechanics; However, based on the CUFT new computational definition of "mass", e.g., as the UCP's computation of the degree of "object-consistent" (spatial) presentations of any given particle across a given number of consecutive USCF's, then this led to one of the first "critical-predictions' of the CUFT (which differentiated it from the predictions of both RT and QM) regarding the greater object "spatial-consistency" of relatively 'more massive' particles (such as the Muon) than for relatively 'less-massive' particles (such as the 'electron'); Therefore, the 'Proton-Radius Puzzle' findings indicating that the 'more massive Muon' would possess a significantly smaller Proton-Radius (e.g., into which it sunk) than the 'less massive electron' particle was shown to precisely confirm one of the 'critical predictions' of the CUFT (see References). Additional specific 'critical predictions' of the CUFT are outlined (e.g., including a specification of their particular 'Experimental Conditions') which can be tested in order to validate the CUFT as potentially "more valid" than the corresponding predictions of both RT and QM; Finally, since this article sets to test one of the (potentially significant) new theoretical postulates of the CUFT, namely: its "Non-Continuous Universal Existence Hypothesis" (NCUEH)– which happens to coincide with a unique CUFT's 'critical prediction' (e.g., clearly differentiating it from the corresponding predictions of both RT & QM); then the extent that this NCUEH postulate of the CUFT may be empirically validated this would clearly point at the replacement of the Old 'Material-Causal' Paradigm underlying both RT and QM by the New 'A-Causal Computation' Paradigm, i.e., including its basic postulation of a "non-continuous", "transient", "phenomenal" physical universe which is being continuously computed- dissolved- re-computed- and evolved- by the singularity of the 'Universal Computational Principle' (UCP); Theoretical ramifications of such an empirical validation of the CUFT's new 'ACC' Paradigm may be quite far reaching, e.g., including two of its additional theoretical postulates: the 'Computational Invariance Principle' indicating that only the singularity of the UCP may be regarded as "computationally-invariant" (e.g., constant) existing both "during" its production of each consecutive USCF's frame/s , as well as "in-between" any two consecutive USCF's frame/s (in which solely the UCP exists without the presence of any physical universe), whereas the entire physical universe (and each of its exhaustive spatial pixels' four basic physical features of 'space', 'time', 'energy' and 'mass') may only be regarded as

"computationally-variant" (e.g., "transient" and "phenomenal") due to its existence only "during" each consecutive USCF's frame/s but not "in-between" any two such consecutive USCF's frame/s; and the 'Universal Consciousness Reality' theoretical postulate evincing that since only this UCP may be deemed as 'computationally-invariant' (existing uniformly and constantly both "during" each consecutive USCF's frame/s and also "in-between" any two consecutive USCF's frames) whereas the entire physical universe is seen as representing only a 'transient' and 'phenomenal' appearance produced by the singularity of this UCP, therefore the 'Universal Consciousness Reality' postulate suggests that (in truth) there exists only one singular 'Universal Computational/Consciousness Reality' – which exists uniformly both "during" its manifestation of the entire physical universe (through its extremely rapid computation of each consecutive USCF's frame/s), as well as "in-between" any two consecutive USCF's frame/s (in which it solely exists without the presence of the physical universe)… Needless to say that the acceptance of such an entirely new conception of the physical universe – as existing "non-continuously" only as a 'transient-phenomenal' manifestation of the singular existence of the 'Universal Computational/ Consciousness Reality' may profoundly alter our basic understanding of the physical cosmos (e.g., including the key role that Individual Human Consciousness may play in it).

II. Methods & Results

We therefore begin with an outlining of a few principle theoretical differences between the CUFT new 'A-Causal Computation' Paradigm and RT's and QM's 'Material-Causal' Paradigm – which we then translate into the formulation of specific "Experimental-Designs" that can empirically validate a few 'critical-predictions' of the CUFT as opposed to the (corresponding) predictions of both RT & QM:

a) 'A-Causal Computation' vs. 'Material-Causality'

One of the principle differences between RT and QM is that whereas RT and QM are underlie by a basic 'Material-Causal' assumption, the 'Computational Unified Field Theory' (CUFT) assumes a new 'A-Causal Computation' (ACC) Paradigm; Hence, RT assumes that the creation of the ("macroscopic") universe was "caused" by an initial "Big-Bang" nuclear explosion and that its further development and evolution is based on "material-causal" physical interactions between "massive objects" which "cause" the "curvature of space-time", and conversely that this "curved space-time" "causes" massive or non-massive objects to travel in particular "travelling-pathways" (as described by Einstein's Equations). Likewise, QM utilizes such a 'material-causal' basic assumption in its description of the "mechanics" of the subatomic physical realm wherein it assumes that there exists a particular subatomic 'target's' "probability wave function" which "collapses" into a single (complimentary energy-spatial or temporal-mass) value as "caused" by its direct physical interaction with another subatomic "probe" element; In contrast, the 'A-Causal Computation' new Paradigm of the CUFT postulates that there cannot exist any such "material-causal" physical relationships – either at RT's macroscopic or QM's microscopic levels, due to the "*simultaneous*" computation of all exhaustive spatial-pixels throughout the entire physical universe at every minimal time-point "Universal Frame/s" (UF's), e.g., at the incredible rate of "$c^2/h" = 1.45^{-42}$ sec'(!) by a singular (higher-ordered) Universal Computational Principle (UCP). Indeed, according to this new 'A-Causal Computation' Model of the CUFT there cannot exist any 'material-causal' physical relationship between any relativistic 'observer' and (space-time, energy-mass) 'phenomenon' or between any subatomic 'target' and 'probe' elements – either at any single or multiple such UF's (due to the UCP's *simultaneous computation* of all exhaustive spatial pixels comprising the entire physical universe at that particular UF/s) or "in-between" any two consecutive UF's in which the whole physical universe "dissolves" back onto the singularity of the UCP… One of the "empirically-testable" ramifications of this new 'A-Causal Computation' Paradigm is to try and detect the "non-continuous" existence of any given subatomic "target" element – i.e., "in-between" any two consecutive UF's frames! Moreover, if indeed all exhaustive spatial pixels in the physical universe are computed "simultaneously" by the UCP (for each consecutive UF's) and "dissolve" (back into the singularity of the UCP) "in-between" any two consecutive UF's, then this would negate the very possibility of the existence of any 'material-causal' physical interactions between any subatomic 'probe' and 'target' elements (currently assumed to "cause" the "collapse of the target's probability wave function), as well as (for instance) the "Higgs-Boss on" particle's direct physical interaction with any other subatomic particle which is currently assumed to impart "mass" to all other subatomic particles!?

Hence, an experimentally-verifiable unique "critical prediction" of the CUFT (which significantly differs from the predictions of both RT and QM) is that:

Nature & Definition of "Mass": Presence of "Massive" vs. "Light" Particles

A potentially significant implication of the CUFT's new ACC Paradigm results from the CUFT's new computational definition of "mass" – as a UCP's computation of the degree of "consistency" in the presentations of any given particle's presence across a series of consecutive UF's frame/s: this is simply because based on the CUFT's new computational definition of "mass" – e.g., as the degree of "object-consistency" of any given subatomic particle across a

series of consecutive UF's frames, one of its 'critical predictions' is that relatively "more massive" particles would be measured across a greater number of UF's frames than "less-massive" particles! The empirical ramification of this CUFT's new 'critical prediction' is that if we are to measure through "minute-temporal resolution" subatomic accelerator measurements the presence of relatively "more massive" particles such as the "Muon" or a relativistic "accelerated Electron" particle), e.g., across a given number of UF's frames – relatively to the measurement of the presence of a relatively "less massive" electron particle, according to the CUFT's "Differential Particle-Mass Presence" (DPMP) critical prediction" the 'more massive' Muon/relativistic Electron particle/s should be detected across a greater number of UF's* (or corresponding "time-samples") relative to the detected presence of the 'less-massive' Electron particles across an equivalent number of UF's (or time-sampling).

One of the potential challenges for experimentally testing of this 'Differential Particle-Mass Presence' (DPMP) unique 'critical prediction' of the CUFT is the fact that whereas the UCP's computation of each consecutive UF's frame/s is hypothesized to occur at the rate of "$c^2/h" = 1.45^{-42}$ sec' , most accelerators can only measure their "Minute-Temporal Measurements" (MTM) at a rate approaching the speed of light, e.g., 3.03^{-6} ; This implies that the available 'MTM' temporal is approximately 0.5^{-36} less-sensitive than the UCP's rate of UF's frames' computation! Nevertheless, even given the fact that the MTM of the current accelerators is 0.5^{-36} less sensitive than the rate at which the UCP computes each consecutive UF's frame/s – since the given MTM rate "samples" the series of UCP's ("$c^2/h" = 1.45^{-42}$ sec') UF's frames, then we should still expect certain CUFT's 'critical predictions' to be validated based on the given accelerators' MTM (sampling) rate:

Therefore, the proposed method for testing these three 'differential-critical predictions' comprises of several different experiments that can verify each of these predictions:

b) Test the CUFT's 'differential-critical' prediction whereby a "more-massive" particle would appear across a greater number of USCF's frames relative to a "less-massive" particle

At least two experimental embodiments for verifying this 'differential-critical prediction' are hereby suggested:

1. Testing CUFT's "Less Temporal Measurements of Less Massive Particles" Prediction

Contrasting between the number of "fine-temporal measurements" (e.g., see below their mathematical calculation) in which a 'more massive particle' would be detected relative to a "less-massive" particle (across the same given number of such fine-temporal measurements): It is suggested to test the CUFT's 'differential-critical prediction' regarding the appearance of the 'more massive particle' at a significantly greater number of 'fine-temporal measurements' than the 'less massive particle' (across the given number of 'fine-temporal measurements'); Specifically, in order to test this 'differential-critical prediction' of the CUFT it is necessary to contrast the number of 'fine-temporal measurements' in which the 'more-massive' 'Muon' relative to the number of 'fine-temporal measurements' in which the 'less-massive' electron particle would be detected. A key point to be note is that the temporal resolution of most accelerators is far less "sensitive" than the hypothesized rate at which the Universal Computational Principle (UCP) computes the series of USCF's frames, i.e., "$c^2/h"=1.45^{-42}$ sec' – with certain accelerators reaching almost the speed of light "$c = 3.33^{-6}$ sec' (e.g., regarded as the 'fine-temporal measurements' accuracy level in this experiment), producing a magnitude difference of x^{-36} sec'; Nevertheless, it is suggested that even if we opt to sample temporal measurements at such a "decreased" temporal resolution (below) the speed of light "$c = 3.33^{-6}$ sec', e.g., in effect sampling a significantly decreased temporal accuracy level (e.g., x^{-36} sec' decreased magnitude of accuracy relative to the rate at which the Universal Computational Principle (UCP) computes the series of USCF's frames (i.e., "$c^2/h"=1.45^{-42}$ sec')) ; we can still expect that the "more massive electron" (relativistic accelerated) particle would appear at a greater percentage of these "$c = 3.33^{-6}$ sec' samplings relative to the number of (decreased accuracy) time-samplings in which the electron would be detected. As stated above, in calculating the CUFT's 'differential-critical prediction' regarding the significantly smaller number of 'fine-temporal measurements' in which the 'electron' particle would be detected relative to the number of such 'fine-temporal points' in which the 'electron' may be measured, we need to correct for the known subatomic (quantum theory related) bias towards a slightly "easier" measurement of such 'more-massive' 'Muon' particle relative to the measurements of a 'less massive' 'electron' particle; In other words the CUFT's 'differential-critical prediction' regarding the significantly greater 'fine-temporal measurements' (FTM) at which the 'more massive' Muon (M) would be detected relative to the number of equivalent 'fine-temporal measurements' at which the 'less-massive' electron (e) particle would be detected should subtract the "quantum measurement bias" (QMB) towards a more 'sensitive temporal measurement' of more massive particle:

$$FTM(M) - QMB > FTM(e)$$

2. A second (almost equivalent) experimental procedure geared towards testing this 'differential-critical prediction' regarding the detection of a 'more-massive' particle at a significantly greater 'fine-temporal-measurements' relative to the

detection of a 'less-massive' particle (measured across the same number of 'fine-temporal measurements), involves the acceleration of a beam of electrons – to two significantly different velocities (relative to the speed of light); The proposed experimental design involves utilizing a special Accelerator which can accelerate a beam of electrons at varying velocities up to 99% of the 'speed of light': given the fact that the more accelerated electrons (relative to the speed of light) are, the greater is their "mass" value, we propose to construct an experimental design wherein the beam of electrons would be accelerated to two significantly different levels: a) electrons that will be accelerated to 99% of the speed of light and hence their "mass" value would increase considerably (possessing a "high-mass value", 'HMV'; and b) a condition in which the beam of electrons would only be accelerated to roughly 10% of the speed of light, therefore possessing a relatively "lower mass value", 'LMV'). Once again, it is suggested that the number of 'fine-temporal measurements' (FTM) in which the 'high-mass value electron' (HMV-e) would be measured (across a given number of FTM) would be significantly higher than the number of FTM in which the 'low-mass value electron' (LMV-e) would be measured (e.g., excluding the above mentioned "quantum measurement bias" 'QMB'):

$$FTM(HMV\text{-}e) - QMB > FTM(LMV\text{-}e).$$

c) *Test the CUFT's Non-Continuous Temporal Existence of the 'Higgs-boson' Prediction*

Namely, test the experimental hypothesis wherein the Higgs-boson particle cannot be detected "in-between" any two consecutive USCF's frames: As discussed above, despite the far less "time-sensitive" measurements enabled by an Accelerator (e.g., which can only conduct measurements that are below the speed of light: "$c = 3.33^{-6}$ sec'), which represent a decreased temporal measurement accuracy in the magnitude of x^{-7}sec' relative to the Universal Computational Principle's (UCP) rate of computing the series of USCF's, "$c^2/h" = 1.45^{-42}$ sec'; Nevertheless, it is hypothesized that it may still be possible to detect the "non-existence" of the Higgs-boson particle "in-between" any two consecutive USCF's frames; However, in order to be able to adjust the measurement of a "Mid-Point" (MP) "in-between" any two consecutive USCF's frames (which involves measurements in the magnitude of "$c^2/h" = 1.45^{-42}$) by a given Accelerator that can only measure a minimal 'fine-temporal measurement' (FTM) in the magnitude of "$c = 3.33^{-6}$ sec', it is necessary to carry out several (computational and experimental) steps, which include:

1. Compute the precise "Accelerator's Temporal Sampling-Ratio" (ATSR)

Compute the above "fine-temporal measurement" (FTM) divided by the "Universal Computation Rate" (UCR) (e.g., the Universal Computational Principle's 'UCP' rate of computing the series of USCF's frames: "$c^2/h" = 1.45^{-42}$ sec'):

$$ATSR = FTM/UCR$$

This (Accelerator-specific) 'ATSR' value provides us with a measure of the precise sampling ratio that exits between the 'Universal Computational Rate' (UCR) (the rate at which the 'Universal Computational Principle' UCP computes every consecutive USCF's frame/s) and the (far-less sensitive) 'fine-temporal measurement' (FTM) rate at which the specific Accelerator measures:

1) Measure the presence of a 'Higgs-boson' particle at a given time "ti".
2) Calculate the "Mid-Point" between this given "ti1" USCF frame and its subsequent "ti2" USCF's frame (USCF-MP-ti{1.5}):

$$USCF\text{-}MP\text{-}ti\{1.5\} = USCF\text{-}ti2 - USCF\text{-}ti1 / 2$$

Calculate the "Accelerator-Detectable Mid-Point" (ADMP):

Adjust this calculated USCF-MP-ti{1.5} based on the Accelerator-specific 'ATSR' in order to "capture" this USCF-MP-ti{1.5} by the "decreased" FTM of the given Accelerator; to accomplish this we simply need to multiply the calculated USCF-MP-ti{1.5} by the Accelerator (specific) ATSR value:

$$ADMP = USCF\text{-}MP\text{-}ti\{1.5\} * ATSR$$

This ADMP (Accelerator-specific) value provides us with a calculation of the precise (measurable) time-point at which the given Accelerator can "detect" the 'Mid-Point' between any such given two consecutive (USCF-ti1 and USCF-ti2) USCF's frames (e.g., due to its "synchronization" of a precise cyclic number of USCF's frames' that elapse from an initial detection of a given USCF's Higgs-boson particle existence – with the 'Accelerator's Temporal Sampling-Ratio' ATSR, to provide the precise Accelerator-Detectable Mid-Point, ADMP).

1) In fact, due to the reoccurrence of such a 'temporal mid-point' (TMP) between every two consecutive USCF's frames

$$USCF\text{-}MP\text{-}ti\{x\}\{1.5\} = USCF\text{-}ti\{n+1\} - USCF\text{-}ti\{n\} / 2$$

It is also possible to measure a "Reoccurring Detectable Mid-Point" (RDMP) thus:

$$RDMB = USCF\text{-}MP\text{-}\mathbf{ti\{x\}}\{1.5\} * ATSR$$

2) We can now test the CUFT's "Non-Continuous Temporal Existence of the 'Higgs-boson" Prediction by trying to measure at any such given RDMP for the existence of the Higgs-boson particle.
3) Moreover, in order to fully validate this second 'differential-critical prediction' of the CUFT, e.g.,

regarding the "Non-Continuous Temporal Existence of the 'Higgs-boson Particle' we now focus on detecting the (same) Higgs-boson particle in the precise (Accelerator-detectable) time-points at which the UCP computes each consecutive USCF's frame/s; (This is based on the CUFT's stipulation that the UCP computes an extremely rapid rate of "c^2/h" = 1.45^{-42} sec' of consecutive USCF's frames, including all of their exhaustive spatial pixels comprising the entire physical universe at every minimal time-point USCF's frame/s – which completely "dissolve" "in-between" any two such consecutive USCF's frames, and is then "re-produced" in the consecutive USCF's frame/s by the UCP.) Therefore, in order to "capture" this UCP's stipulated "re-production" of the Higgs-boson particle with each consecutive USCF's frame/s we construct the experimental design to aim measuring those FTM measurements occurring at precisely each "Detectable Recurring USCF's" (DR-USCFs):

$$DR\text{-}USCFs = USCF\text{-}ti\{x\} = USCF\text{-}ti\{i..n\} * ATSR$$

Indeed, according to this CUFT's second 'Non-Continuous Temporal Existence of the 'Higgs-boson" Prediction, it is predicted that if we alternate between measurements of "Detectable Recurring USCF's" (DR-USCFs) – in which the 'Higgs-boson' particle can be detected, and measurements of "Reoccurring Detectable Mid-Point/s" (RDMP) – in which the 'Higgs-boson' particle cannot be detected; we may reach the inevitable conclusion that the Higgs-boson particle may not exist "continuously"… More significantly, since the Higgs-boson particle is currently assumed to impart "mass" to all other subatomic particles, then to the extent that it may be shown empirically to "not-exist" "in-between" any two consecutive USCF's frames, then this implies that no other subatomic particle/s can "exist" – "in between" any two consecutive USCF's frames!

d) Test "Non-Continuous Temporal Existence of Other Subatomic Particles" Prediction

Indeed, to the extent that the above empirical testing of the "non-existence" of the 'Higgs-boson' particle "in-between" any two consecutive USCF's frames would be verified experimentally, this would lead to a broader testing of the "non-existence" of other subatomic particles "in-between" any two consecutive USCF's frames (e.g., based on the above mentioned 'fine temporal measurement' (FTM) which is adjusted to the Accelerator's ATSR; at least two different "embodiments" (experimental design and set-up) that can test this new intriguing 'differential-critical prediction':

1. Utilizing any given Accelerator to test for the "dissolution" of various subatomic particles "in-between" any two consecutive USCF's frames and their "re-production" at any consecutive USCF's frame/s (based on an equivalent experimental design as listed above – adjusted to the given Accelerator's specific ATSR value as explained above).
2. Utilizing the above mentioned special Accelerator capable of accelerating electrons up to the "speed of light", we can use the same (above mentioned) methodology to calculate the Accelerator's ATSR and RDMB, DR-USCFs which would allow for an empirical testing of the UCP's "production"- "dissolution"- and "re-production"- of differentially accelerated electrons (which possess different masses).
3. Test the Non-Continuous Universal Consciousness Expansion Hypothesis

As mentioned earlier, the CUFT's new 'A-Causal Computation' Paradigm negated the very possibility of the existence of any "material-causal" physical relationships between any subatomic 'probe' and 'target' particles or between any two relativistic elements – which also led to the CUFT's principle negation of the existence of "dark-matter" and "dark-energy" which are assumed to "cause" the empirically observed accelerated expansion of the physical universe. (This is due, once again to the CUFT's new 'A-Causal Computation' Paradigm's stipulation that the singular Universal Computation/Consciousness Principle simultaneously computes all exhaustive spatial pixels comprising the entire physical universe at any consecutive Universal Frame/s (UF's) which negates the possibility of the existence of any such 'material-causal' physical relationship between any two or more exhaustive spatial pixels in the universe "during" any single/multiple UF's, or indeed "in-between" any two consecutive UF's frames wherein the entire physical universe "dissolves" back into the singular UCP…) Hence, the CUFT's new 'ACC' Paradigm advanced an alternative new explanation for the empirically observed accelerated expansion of the physical universe: the physical universe seems to expand, e.g., at an accelerated rate – simply due to the fact that the UCP computes each consecutive UF's frame/s with an accelerated increase in the number of exhaustive spatial pixels comprising it!

Interestingly, due to the CUFT's stipulation that the singular Universal Consciousness Principle (or Universal Consciousness Reality) is intimately connected to certain manifestations of our Individual Human Consciousness, there arises an intriguing new 'critical prediction' of the CUFT namely: the "Non-Continuous Universal Consciousness Reality's Expansion Hypothesis" (NCUCRH);

In a nutshell, this new NCUCRH critical prediction of the CUFT hypothesizes that since our Individual Human Consciousness was shown to be "inseparable" from the Universal Consciousness Reality

– i.e., in two of the Individual Human Consciousness' States: in the "Deep Sleep" state and in the "Expanded Waking" state, as well as potentially in a "Collective Individual Human Consciousness Focused State" (CIHCFS), e.g., in which there exists a "collective human consciousness focus/prayer"; therefore, it is hypothesized that it may be the case that during such "Collective Individual Human Consciousness Focused State" (CIHCFS) – this may affect the Universal Consciousness Reality's accelerated expansion of the physical universe. Specifically, it is suggested that perhaps there exists a "non-continuous accelerated expansion of the physical universe" around the "Collective Individual Human Consciousness Focused State" (CIHCFS) of the new Jewish Year ("Rosh Hashanna"), at which time the accelerated expansion of the physical universe may be "non-continuous"! Therefore an interesting possible critical prediction of the CUFT is that at- or around- "Rosh Hashanna" (the Jewish New Year at which there is intense "Collective Individual Human Consciousness Focused State") the accelerated rate of the expansion of the physical universe may be found to be non-continuous!

III. Discussion

This article sets to test several unique "Critical Predictions" of the CUFT's new 'A-Causal Computation' Paradigm, which critically differ from those of both RT and QM, which include: the appearance of relatively 'more massive' particles (such as the Muon or an electron accelerated to 90% of the Speed of Light) at a greater number of UF's frames than the appearance of relatively 'less-massive' particles (such as the electron, or such as an electron that is accelerated only to 5% of the Speed of Light as opposed to the above mentioned electron accelerated to 90% of the Speed of Light); The "non-continuous" existence of the 'Boson-Higgs' particle (or any other measured particle) – only "during" each consecutive UF's frame (e.g., or sampling thereof), but not "in-between" any two consecutive UF's; And the "non-continuous" accelerated expansion of the physical universe – possibly associated with the hypothetical effects of "Collective Individual Human Consciousness Focused State" (CIHCFS), e.g., such as for instance around "Rosh Hashanna" upon the singular Universal Consciousness Reality's accelerated increase in the number of exhaustive spatial pixels comprising each consecutive UF's;

The possible significance of an empirical validation of each of these 'Critical Predictions' of the CUFT may be quite far reaching: As shown above (and previously), 21st century Theoretical Physics is undergoing a major Paradigmatic Shift from the Old 'Material-Causal' Paradigm to the New 'A-Causal Computation' Paradigm of the CUFT; In a nutshell, this Paradigmatic Shift is based (first and foremost) upon the CUFT's 'A-Causal Computation' Paradigm's realization that there exists a singular (higher-ordered) Universal Consciousness Reality which simultaneously computes every exhaustive spatial pixel in the universe at each consecutive UF's frame/s (at the incredible rate of "c^2/h" = 1.45^{-42} sec'!) It is this simultaneity of the UCP's computation of all exhaustive spatial pixels in the physical universe (for each consecutive UF's frame/s) which negates the very possibility of the existence of any 'material-causal' physical relationships between any two (or more) exhaustive spatial pixels existing at any single- or multiple- UF's frame/s (or indeed "in-between" any two consecutive UF's frames in which all exhaustive spatial pixels of the universe "dissolve" back into the singularity of the Universal Consciousness Reality (UCR)); Directly stemming from this CUFT's New 'A-Causal Computation' Paradigm's principle negation of the existence of any 'material-causal' physical relationships at either the relativistic or quantum levels were derived several far reaching theoretical implications relating to this new ACC Paradigm of 21st century Theoretical Physics:

a) Negation of the 'Big-Bang' Model

Since there cannot exist any such 'material-causal' physical relationship/s between any two (or more) exhaustive spatial pixels comprising the entire physical universe (at any single- or multiple- UF's, or indeed "in-between" any two consecutive UF's wherein the entire physical universe "dissolves" back into the singular Universal Consciousness Reality), the CUFT new 'ACC' Paradigm was shown to negate the 'Big-Bang' Model which postulates that an initial 'material-causal' physical interaction between a nuclear explosion and the creation of all of the stars, galaxies, "matter" "energy" etc. in the universe; Instead, according to the CUFT's new ACC Paradigm, the entire physical universe is being continuously computed- "dissolved"- recreated- and evolved- solely based on the singular Universal Consciousness Reality's simultaneous computation of all exhaustive spatial pixels in the universe at every minimal time-point UF's frame/s. Significantly, the empirical validation of one of the 'Critical Predictions' (outlined in this article) pertaining to the "non-existence" of the Higgs-Boson particle (as well as any other measured particle) "in-between" any two consecutive UF's frames goes a long way in supporting the CUFT's new 'ACC' Paradigm's assertion that the entire physical universe could not have been "caused" by an initial Big-Bang nuclear explosion – i.e., due to the "dissolution" of the whole physical universe back into the singular Universal Consciousness Reality "in-between" any two consecutive UF's frames; Instead, the new CUFT's ACC Paradigm asserts that the entire physical universe does not exist "continuously" but is rather being continuously computed- "dissolved"- re-created- and evolved- solely based on the operation of the singular Universal Consciousness Reality; In fact, as mentioned before, the

Universal Consciousness Reality (and its closely related 'Computational Invariance Principle' theoretical postulate) brings about a fundamental revision in our basic conception of the physical universe (e.g., at both its relativistic and quantum levels) – as only a manifestation of the singular Universal Consciousness Reality which solely exists both "during" its simultaneous computation of each exhaustive spatial pixel in the universe at each consecutive UF's frame/s, and also solely exists "in-between" any two consecutive UF's frames (without the presence of any physical universe). Hence, the Computational Invariance Principle deemed the four basic physical features comprising each exhaustive spatial pixel constituting the physical universe (as well as the entirety of the physical universe) as "computationally-variant", e.g., existing only "phenomenally" and "transiently" 'during' each consecutive UF's frame's as solely computed by the Universal Consciousness Reality but cease to exist "in-between" any two consecutive UF's frames; whereas the singular existence of the Universal Consciousness Reality (UCR) is considered as 'computationally invariant' – that is, exists constantly both "during" its computation of each exhaustive spatial pixel in the universe and also "in-between" any two consecutive UF's frames; Theoretically this means that the physical universe (and every exhaustive spatial pixel/s comprising it) exists only as a "transient", "phenomenal" manifestation of the singular Universal Consciousness Reality!

b) Negation of "Dark-Matter", "Dark-Energy" & Einstein's Equations Material-Causal Assumption

Another derivative of the CUFT's New 'ACC' Paradigm's principle negation of the existence of any 'material-causal' physical relationship/s between any two (or more) exhaustive spatial pixels in the universe was its negation of the existence of the hypothetical "dark-matter" or "dark-energy" hypothetical concepts, as well as of Einstein's Equations' (implicit) 'material-causal' assumption: As shown previously, the very existence of the purely hypothetical concepts of "dark-matter" and "dark-energy" is negated through the ACC Paradigm's assertion that there cannot exist any 'material-causal' physical relationships between any two exhaustive spatial pixels in the universe (at any single or multiple UF's frame/s). this is because if the Universal Consciousness Reality indeed simultaneously computes each exhaustive spatial pixel in the universe at every consecutive UF's frame/s then it nulls- and negates- the Old 'Material-Causal' 20th century Paradigm underlying both RT(and QM) assuming that the accelerated expansion of the physical universe is "caused" by the effect of the (empirically undetected) "dark-matter" or "dark-energy" upon the expansion of the universe. More generally (again as shown previously) this new CUFT's ACC Paradigm was shown to question- and negate- the 'material-causal' assumption of General Relativity Theory expressed through 'Einstein's Equations' which assume that it is the direct physical interaction between certain "massive-objects" with "space-time" which "causes" its "curvature", and conversely that it is this "curved space-time" which "causes" those massive (and other non-massive) objects to travel in particular travelling pathways; Instead, the new CUFT's ACC Paradigm postulates that not only the creation of the entire physical universe – couldn't have been "caused" by an initial 'Big-Bang' nuclear explosion (as shown above and previously), but is rather being continuously computed- "dissolved"- re-computed- and evolved- by the singularity of the UCR at each of its consecutive UF's frame/s; but also the accelerated expansion of the entire physical universe is produced solely through the operation of this singular UCR's accelerated addition of the number of exhaustive spatial pixels comprising each consecutive UF's frame/s! Significantly, the possible empirical validation of the "Collective Individual Human Consciousness Focused State" (CIHCFS) 'Critical Prediction' of the CUFT could provide a direct validation of this new 'A-Causal Computation' Paradigm's theoretical account of the accelerated expansion of the physical universe (e.g., which is not based on the "dark-energy", "dark-matter" hypothesis negated by the ACC Paradigm). This is because precisely due to the ACC's principle negation of the possibility of the existence of any (quantum or relativistic) 'material-causal' physical relationships – i.e., including its negation of the existence of 'dark-matter', 'dark-energy' or even the 'material-causal' implicit assumption underlying 'Einstein's Equations'; the possible empirical validation of the CUFT's Critical Prediction of "Collective Individual Human Consciousness Focused State" (CIHCFS) which may be tested also around the Jewish New Year's 'Rosh Hashanna's predicted "non-continuous" accelerated expansion rate of the physical universe may directly point at the 'A-Causal Computation' Paradigm's basic assumption that it is solely the operation of the singular Universal Consciousness Reality which produces- "dissolves"- sustains- and evolves- including its accelerated addition of the number of exhaustive spatial pixels comprising each consecutive UF's frame/s (which brings about the appearance of an accelerated expansion of the physical universe… Specifically, the empirical validation of the CUFT's Critical Prediction of "Collective Individual Human Consciousness Focused State" (CIHCFS) possibly through an astronomical observation relating to the "non-continuous" accelerated expansion of the physical universe around the Jewish "Rosh Hashanna" (e.g., this year 2018 around the 9th of September) may point at the centrality of the Universal Consciousness Reality's (previously stipulated) "Free-Will" Hypothesis and strongly supporting the intimate connection that exists between the singular UCR and our own Individual Human Consciousness – e.g.,

whether through the newly hypothesized "Collective Individual Human Consciousness Focused State" (CIHCFS) or whether through the previously stipulated "Individual Human Consciousness Expansive Spectrum Hypothesis" (IHCESH) (which hypothesize that an "expanded" Individual Human Consciousness can function equivalently to the UCR!) Once again, such possible empirical validation of the "Collective Individual Human Consciousness Focused State" (CIHCFS) brings about a fundamental revision of our basic understanding of the singular UCR underlying the manifestation of the entire physical universe, and indeed points at last significant theoretical implication (in this article):

c) *The Non-Continuous Universal Consciousness Reality Hypothesis (NCUCRH)*

We now reach another "apex" in the CUFT's New 'A-Causal Computation' Paradigm's basic revision of our understanding and conception of the physical universe's only "transient", "phenomenal" manifestation of the singular Universal Consciousness Reality: If indeed, empirical testing of these various (abovementioned) unique Critical Predictions of the CUFT would validate them then this would point at a new Non-Continuous Universal Consciousness Reality Hypothesis (NCUCRH), which succinctly stated indicates that the whole physical universe – both at its macroscopic relativistic and microscopic quantum levels exists only "non-continuously" solely as a manifestation of the singular Universal Consciousness Reality! This is because if indeed empirical testing would indicate that the Boson-Higgs particle (as well as other measurable particles) exists "non-continuously" only "during" each consecutive UF's but not "in-between" any two consecutive UF's, and especially given the Boson-Higgs assumed role in imparting "mass" to all other subatomic particles (e.g., and the CUFT's abovementioned ACC Paradigm's principle negation of the possibility of the existence of any "material-causal" physical relationships between any two or more exhaustive spatial pixels including between this Boson-Higgs and other particles); then this would force us to accept the reality of the existence of a singular Universal Consciousness Reality which solely exists both "during" each consecutive UF's frame/s manifesting at each exhaustive spatial pixel that it simultaneously computes, as well as solely exists "in-between" any two consecutive UF's frames without the presence of the physical universe;

Moreover, another manifestation of this new 'Non-Continuous Universal Consciousness Reality Hypothesis' (NCUCRH) would be supported through the abovementioned empirical validation of a "non-continuous" accelerated expansion of the universe around the Jewish 'Rosh Hashanna' (as an example of the possible effects of Collective Human Consciousness Focus; In such case, this would imply that the singular Universal Consciousness Reality – not only "non-continuously" at both the quantum and relativistic levels: At the relativistic level, this singular UCR's would indicate that its accelerated expansion of the number of exhaustive spatial pixels comprising the entire physical universe exists "non-continuously", i.e., as instigated by some sort of a "Free-Will Hypothesis" wherein the UCR is affected by 'Collective Human Consciousness Focus' and seems to possess a 'Free-Will' (as it is not "bound" by any natural laws, since it produces all exhaustive spatial pixels of the universe at each consecutive UF's frame/s and solely exists without the physical universe "in-between" any two consecutive UF's and can "decide" to "alter", "halt" or "expedite" its accelerated addition of the number of exhaustive spatial pixels for each consecutive UF's frame/s. At the microscopic quantum level, as mentioned above, this Non-Continuous Universal Consciousness Reality Hypothesis (NCUCRH) would manifest through measurements of the 'non-existence' of the Boson-Higgs particle (or other measured particles) 'in-between' any two consecutive UF's frames – and thereby further strengthen the basic metamorphosis in our conception of the physical universe as merely a "phenomenal", "transient", "non-continuous" manifestation of the singular Universal Consciousness Reality…

References Références Referencias

1. Bentwich, J. (2006a). The 'Duality Principle': Irreducibility of sub-threshold psychophysical computation to neuronal brain activation. Synthese, Vol. 153, No. 3, pp. (451-455).
2. Bentwich, J. Universal Consciousness: From Materialistic Science to the Mental Projection Unified Theory, iUniverse Publication (2006b).
3. Bentwich, J. (2012a) "Harmonizing Quantum Mechanics and Relativity Theory". Theoretical Concepts of Quantum Mechanics, Intech (ISBN 979-953-307-377-3), Chapter 22, pp. 515-550.
4. Bentwich, J. (2012b) "Theoretical Validation of the Computational Unified Field Theory". Theoretical Concepts of Quantum Mechanics, (ISBN 979-953-307-3773), Chapter 23, pp. 551-598.
5. Bentwich, J. (2013a). "The Theoretical Ramifications of the Computational Unified Field Theory". Advances in Quantum Mechanics (ISBN 978-953-51-1089-7), Chapter 28, pp. 671-882.
6. Bentwich, J. (2013b). The Computational Unified Field Theory (CUFT): A Candidate Theory of Everything. Advances in Quantum Mechanics (ISBN 978-953-51-1089-7) Chapter 18, pp. 395-436.
7. Bentwich, J. (2014a) What if Einstein was Right? Amazon Kindle Book Store.
8. Bentwich, J. (2014b). On the Geometry of Space, Time, Energy, and Mass: Empirical Validation of the

Computational Unified Field Theory. Proceedings of VIGIER IX Conference – Unified Mechanics: Natural Science Beyond the Veil of Spacetime, Baltimore, Maryland.

9. Bentwich, J. (2015). On the Geometry of Space, Time, Energy & Mass: Empirical Validation of the Computational Unified Field Theory. Proceedings of Vigier IX – Unified Mechanics: Natural Science Beyond the Veil of Spacetime (Baltimore, Maryland).
10. Bentwich, J. (2016) The 'Computational Unified Field Theory': A Paradigmatic Shift. Research & Reviews: Journal of Pure & Applied Physics.
11. Bentwich, J. (2017a) The Computational Unified Field Theory: Could 'Dark Matter' & 'Dark Energy' be "Superfluous"? Research & Reviews: Journal of Pure & Applied Physics, Special Issue: The Computational Unified Field Theory (CUFT)- A Paradigmatic Shift in 21st Century Physics.
12. Bentwich, J. (2017b) The Computational Unified Field Theory: Explaining the Universe from "Without". Research & Reviews: Journal of Pure & Applied Physics, Special Issue: The Computational Unified Field Theory (CUFT)- A Paradigmatic Shift in 21st Century Physics.
13. Bentwich, J. (2017c). The Computational Unified Field Theory: A New 'A-Causal Computation' Physics. Research & Reviews: Journal of Pure & Applied Physics, Special Issue: The Computational Unified Field Theory (CUFT)- A Paradigmatic Shift in 21st Century Physics.
14. Bentwich, J. (2017d). The 'Computational Unified Field Theory' (CUFT) May Challenge the 'Big-Bang Theory'. Research & Reviews: Journal of Pure & Applied Physics, Special Issue: The Computational Unified Field Theory (CUFT)- A Paradigmatic Shift in 21st Century Physics.
15. Bentwich, J. (2017e). Can the 'Computational Unified Field Theory' (CUFT) Challenge the Basic Laws of Conservation? Research & Reviews: Journal of Pure & Applied Physics, Special Issue: The Computational Unified Field Theory (CUFT)- A Paradigmatic Shift in 21st Century Physics.
16. Bentwich, J. (2017f). The Computational Unified Field Theory: Time Reversal May be Possible. Research & Reviews: Journal of Pure & Applied Physics, Special Issue: The Computational Unified Field Theory (CUFT)- A Paradigmatic Shift in 21st Century Physics.
17. Bentwich, J. (2017g). The Computational Unified Field Theory (CUFT) Transcends Relativity's Speed of Light Constraint. Research & Reviews: Journal of Pure & Applied Physics, Special Issue: The Computational Unified Field Theory (CUFT)- A Paradigmatic Shift in 21st Century Physics.
18. Bentwich, J. (2017h). The Computational Unified Field Theory's New Physics: Transcending Space, Time and Causality. Research & Reviews: Journal of Pure & Applied Physics, Special Issue: The Computational Unified Field Theory (CUFT)- A Paradigmatic Shift in 21st Century Physics.
19. Bentwich, J. (2017i). A "Supra-Spatial-Temporal Universal Consciousness Reality'. Research & Reviews: Journal of Pure & Applied Physics, Special Issue: The Computational Unified Field Theory (CUFT)- A Paradigmatic Shift in 21st Century Physics.
20. Bentwich, J. (2017j). A New Science: An Infinite Omniscient Dynamic-Equilibrium Universal Consciousness Reality. Research & Reviews: Journal of Pure & Applied Physics, Special Issue: The Computational Unified Field Theory (CUFT)- A Paradigmatic Shift in 21st Century Physics.
21. Bentwich, J. (2017k). The Computational Unified Field Theory (CUFT) Challenges the Second Law of Thermodynamics.Research & Reviews: Journal of Pure & Applied Physics, Special Issue: The Computational Unified Field Theory (CUFT)- A Paradigmatic Shift in 21st Century Physics.
22. Bernauer & Pohl (2014). The Proton Radius Puzzle. Scientific American, 310 (2), p. 20-24.
23. Born, M. (1954).The statistical interpretation of quantum mechanics, Nobel Lecture, December 11,
24. Brumfiel, G. (2006). Our Universe: Outrageous fortune. Nature, Vol. 439, pp. (10-12).
25. Ellis, J. The Superstring: Theory of Everything, or of Nothing? Nature, Vol. 323, No.089, pp. (595–598) (1986).
26. Giacosa, Francesco (2014). "On unitary evolution and collapse in quantum mechanics".Quanta 3 (1): 156–170. doi:10.12743/quanta.v3i1.26.
27. Greene, B. The Elegant Universe, Vintage Books, New York (2003).
28. Heisenberg, WÜber den anschaulichen Inhalt der quantentheoretischen Kinematikund Mechanik. Zeitschrift für Physik, Vol. 43 No. 3–4, pp. (172–198) (1927).
29. Horodecki, R.; Horodecki, P.; Horodecki, M. & Horodecki, K. Quantum entanglement. Rev. Mod. Phys, Vol. 81, No. 2, pp. (865–942) (2007).
30. J. von Neumann (1932). Mathematische Grundlagen der Quantenmechanik (in German). Berlin: Springer.
31. J. von Neumann (1955). Mathematical Foundations of Quantum Mechanics. Princeton University Press.
32. Kuhn, Thomas S. (1962). The Structure of Scientific Revolutions (1st ed.). University of Chicago Press. p. 172. LCCN 62019621
33. "Ockham's razor". Encyclopædia Britannica. Encyclopædia Britannica Online. http://www. britannica. com/EBchecked/topic/ 424706/Ockhams -razor. Retrieved 12 June 2010.

34. Polchinski, J. All Strung Out? American Scientist, January-February 2007 Volume 95, Number 1 (2007).

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Global Journal of Science Frontier Research: a
Physics and Space Science
Volume 18 Issue 7 Version 1.0 Year 2018
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4626 & Print ISSN: 0975-5896

Wave Engine with Internal Energy Consumption of Electromagnetic Cones

By F. F. Mende

Abstract- At the basis of reactive thrust the law of momentum conservation lies. If from the closed system in some direction is ejected work substance, for example mass, then there is always a recoil momentum, which is reactive thrust. In the photon engines work substance are electromagnetic (EM) waves. Before the appearance of works the description of engines of the type. EmDrive were not known the jet engines, in which there is no ejection of work substance. The electromagnetic waves, which outside engine do not leave, are work substance in the engines of such type, but is formed standing wave in the resonator. The works, carried out by the Chinese scientists, who installed this engine on the satellite, they proved its fitness for work. However, the theoretical substantiation of the work of such engines up to now is absent. In the proposed article the attempt to find the physical substantiation of their work is made.

Keywords: *jet engine, resonator, electromagnetic wave, power, force, the engine emdrive.*

GJSFR-A Classification: *FOR Code: 260203*

Strictly as per the compliance and regulations of:

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I. Introduction

At the basis of reactive thrust the law of momentum conservation lies. If from the closed system in some direction mass is ejected, then there is always a recoil momentum, which is reactive thrust.

It is known that the electromagnetic waves with the drop on any surface exert to it pressure. If there is an antenna, which emits electromagnetic waves, then the emission of such waves always accompanies the recoil momentum, opposite to the direction of the emission EM waves.

It is known that there are radio-technical systems, which ensure the emission EM waves in some preferred direction. Radars, which ensure the narrow radiation pattern EM of energy in the assigned direction, are an example of such systems. With this emission exiter experiences pressure in the direction reverse to the direction of the emission of energy.

The jet engines, in which the engine thrust is created due to the expiration of electromagnetic radiation, is conventionally designated as conditionally the photon engines [1, 2]. The most feasible discharge velocity, equal to the speed of light in the vacuum, is the key advantage of such engines. For the rocket apparatus this is the only widely known method to reach the any considerable proportion of light of velocity with the reasonable values of the mass ratio Z, of that characterizing the mass-ratio of the filled and empty rocket. Necessary to note, however, that also in this case the discussion deals with number Z on the order of several hundreds, with the technically realized values of order 10 for the multistage rockets. The low efficiency of the chain of the conversion of energy from the primary source to the flow of the expiration of electromagnetic radiation is a central failure in the photon engine. The application of reaction of annihilation for direct obtaining of the expiration of electromagnetic radiation considerably does not descend the sharpness of problem, since it is necessary to consider losses to the storage of antimatter (to say nothing of its production) and difficulty of the focusing of the obtained emission. Furthermore, as more real, were examined the use as the source of electromagnetic radiation of thermonuclear plasma (including for the generation of laser emission) and the use of emission of more long-wave range. In the first case the problems of generation and borrowing in the steady state of plasma with the necessary parameters remain thus far unresolved. In the second case the task of the focusing of radiant flux considerably simplifies, but the efficiency of propeller complex sharply are decreased.

II. Engine System Emdrive

A question of the creation of engine EmDrive, in which is absent the ejection of the outside work substance in the form of electromagnetic radiation, long ago it is discussed sufficiently. In Wikipedia even there is an article with this name https://ru.wikipedia.org/wiki/EmDrive.

Let us give the brief theses of this article.

EmDrive - engine installation, consisting of the magnetron and resonator , assumed fitness for work of which will not be coordinated with the contemporary scientific ideas.

Installation EmDrive was for the first time proposed British by the engineer by Roger John Shawyer in 1999. The magnetron utilized in it generates microwave, energy of their fluctuations is accumulated in the resonator high quality, and, on the statements of the author, the standing wave the electromagnetic vibrations in the locked resonator of special form it is the source the thrust. Out of the resonator is not

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emitted not only the substance, but also electromagnetic radiation, EmDrive it is not in other words, photon engine. But even if the micro waves created by magnetron completely were emitted in one direction, the obtained thrust would be considerably less than the declared thrust EmDrive.

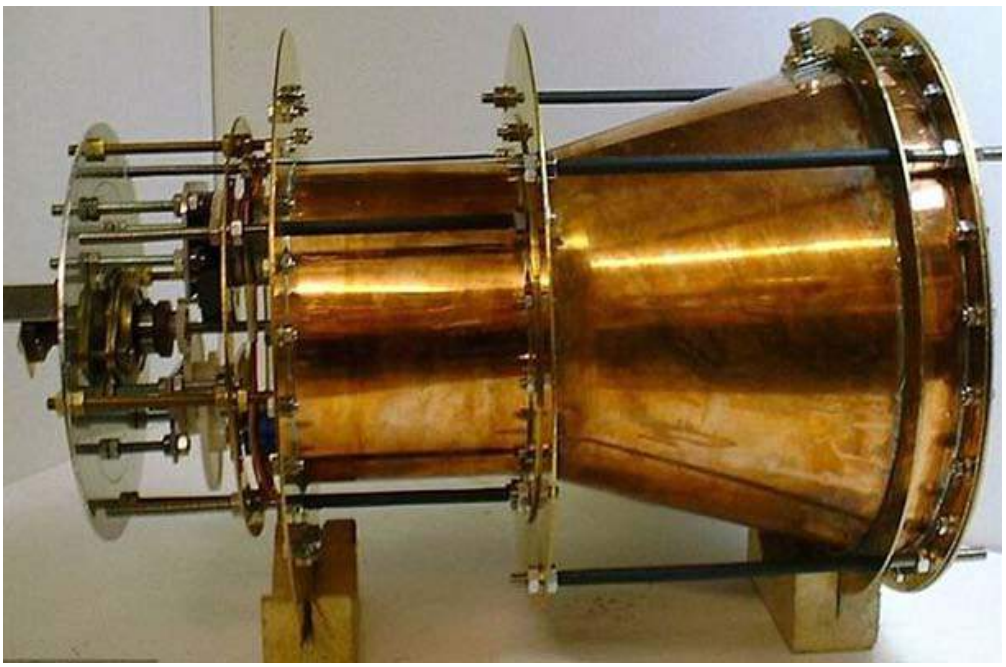
Absence of that expended the working component , apparently, it disrupts in this engine the law of momentum conservation, and any conventional explanation of this contradiction by the authors of developments is not proposed. Shawyer itself published work with the explanation, but physics they note that the theory of radiation pressure is more complex than the simplified apparatus, used by Shawyer, but its explanations as a whole are contradictory.

Experimental data do not give single-valued confirmation or refutation of the fitness for work of a similar installation, which is connected, including with the small magnitude of the assumed effect, compared with errors of measurement.

Physics are explained the obtained by experimenters not numerous positive results by the errors in the experiments. The only published in the scientific journal independent study, which showed positive result, this is the experiment of the groupEagleworks2016; in it many sources of possible errors were removed; however, scientific group of the Dresden technical university assumes that the thrust obtained Eagleworks by group appeared as a result of the influence of earth's magnetic field to the elements of installation, but not because of the very EmDrive.

In December 2016, referring to press conference of one of the daughterly companies Chinese academy of the space technologies (CAST), the publication International Business Times it reported that the government of Chinese Peoples' Republic from 2010 finances studies of engine, and prototypes EmDrive were sent for space for the checking on board the space laboratory « Eyangun-2 ». Doctor Chen Yue from CAST, according to publication International Business Times, confirmed the fact of the production of the prototype of engine for the testing in the low near earth orbit.

In September 2017 appeared new communications about the successful creation of the working prototype of engine EmDrive in China. Even photograph of engine is given.



Theoretical physics predicts that EmDrive it is inefficient and any positive results of experiments can be only the artifacts of measurements, since the fitness for work EmDrive would contradict the law of momentum conservation. Different theoretical explanations EmDrive which contradict the ideas, established in physics were proposed for the assumed fact of fitness for work.

In the proposed article the attempt to find the theoretical substantiation of the work of the engines is made EmDrive.

III. Physics Of Ponderomotive the Action Of Electromagnetic Fields On

The important task of electrodynamics is the presence of laws governing the appearance of electrical fields on, and, therefore, also the forces of those acting on the charge, at the particular point spaces, since. only electric fields, generated other one or method or

another, exert power influences on the charge. Such fields can be obtained, changing the arrangement of other charges around this point of space or accelerating these charges. If around the point in question is some static configuration of charges, then the tension of electric field will be at the particular point determined by the relationship $\mathbf{E} = -\operatorname{grad}\varphi$, where φ the scalar potential at the assigned point, determined by the assigned configuration of charges. To another configuration of charges correspond other values of scalar potential, and, therefore, also other values of the tension of electric field at the assigned point. But, making this, it is necessary to move charges in the space, and this displacement in the required order is combined with their acceleration and subsequent retarding. Acceleration or retarding of charges also can lead to the appearance in the surrounding space of induction electrical fields on. Can arise another stationary situation, when after their acceleration charges move in the environment of the considered point with the constant velocity along circular or other locked trajectories. In this case due to the presence of the three-dimensional velocity gradients in the flows of the moving charges configurative electric fields can appear.

In the electrodynamics the fundamental law of induction is Faraday law [3-5]. In the contemporary electrodynamics it is written in the form

$$\oint \mathbf{E} d\vec{l} = -\frac{\partial \Phi_B}{\partial t} = -\mu \int \frac{\partial \mathbf{H}}{\partial t} d\mathbf{s} = -\int \frac{\partial \mathbf{B}}{\partial t} d\mathbf{s}, \quad (3.1)$$

where $\mathbf{B} = \mu\mathbf{H}$ - magnetic induction vector, $\Phi_B = \mu \int \mathbf{H} d\mathbf{s}$ - flow of magnetic induction, and $\mu = \tilde{\mu}\mu_0$ - magnetic permeability of medium. It follows from this law that the circulation integral of the vector of electric field is equal to a change in the flow of magnetic induction through the area, which this outline covers. It is immediately necessary to emphasize the circumstance that the law in question presents the processes of mutual induction, since. for obtaining the circulation integral of the vector $\mathbf{E}$ we take the strange magnetic field, formed by strange source. From relationship (3.1) obtain the Maxwell first equation

$$\operatorname{rot}\mathbf{E} = -\partial\mathbf{B}/\partial t. \quad (3.2)$$

Let us immediately point out to the terminological error. Faraday law should be called not the law of electromagnetic, as is customary in the existing literature, but by the law of magnetoelectric induction, since change in the magnetic fields on it leads to the appearance of electrical fields on, but not vice versa.

Let us introduce the vector potential of the magnetic field $\mathbf{A}_H$, which satisfies the equality

$$\mu \oint \mathbf{A}_H d\mathbf{l} = \Phi_B,$$

where the outline of the integration coincides with the outline of integration in relationship (3.1), and the vector of is determined in all sections of this outline, then

$$\mathbf{E} = -\mu \partial \mathbf{A}_H / \partial t \quad (3.3)$$

introduced thus vector $\mathbf{A}_H$ determines the local connection between it and by electric field, and also between the gradients this vector and the magnetic field. It is connected with the magnetic field:

$$\operatorname{rot}\mathbf{A}_H = \mathbf{H} \quad (3.4)$$

Thus, if is determined vector $\mathbf{A}_H$, its local time derivative at any point of space, and also its gradients, then it is possible to determine immediately both vector $\mathbf{E}$, and vector $\mathbf{H}$.

The vector potential of magnetic field can be directly obtained also from the Ampere law, which was known long before Maxwell's equations. The Ampere law, expressed in the vector form, determines magnetic field at the point x, y, z:

$$\mathbf{H} = \frac{1}{4\pi} \int \frac{I d\mathbf{l} \times \mathbf{r}}{r^3},$$

where I - current in the element $d\mathbf{l}$, $\mathbf{r}$ - vector, directed from $d\mathbf{l}$ to the point x, y, z.

It is possible to show that

$$\frac{[\mathbf{r} d\mathbf{l}]}{r^3} = \operatorname{grad}\left(\frac{1}{r}\right) \times d\mathbf{l};$$

$$\operatorname{grad}\left(\frac{1}{r}\right) \times d\mathbf{l} = \operatorname{rot}\left(\frac{d\mathbf{l}}{r}\right) - \frac{1}{r}\operatorname{rot} d\mathbf{l}.$$

But the rotor $d\mathbf{l}$ is equal to zero and therefore is final

$$\mathbf{H} = rot \int I \left(\frac{d\mathbf{l}}{4\pi r}\right) = rot \mathbf{A}_H,$$

where

$$\mathbf{A}_H = \int I \left(\frac{d\mathbf{l}}{4\pi r}\right).$$

In this case vector potential is determined no longer through the magnetic flux, but through the

current, which flows through the specific section of conductor. The remarkable property of this expression is that that the vector potential depends from the distance to the observation point as. Specifically, this property makes it possible to obtain emission laws.

Since $I = gv$, where g the quantity of charges, which falls per unit of the length of conductor, we obtain:

$$\mathbf{A}_H = \int \frac{gv\ d\mathbf{l}}{4\pi r}.$$

For the single charge e this relationship takes the form:

$$\mathbf{A}_H = \frac{e\mathbf{v}}{4\pi r},$$

and since is fulfilled relationship (3.3), that

$$\mathbf{E} = -\mu \int \frac{g\frac{\partial v}{\partial t} d\mathbf{l}}{4\pi r} = -\mu \int \frac{ga\ d\mathbf{l}}{4\pi r},$$

where a - acceleration of charge.

This relationship appears as follows for the single charge:

$$\mathbf{E} = -\frac{\mu e\mathbf{a}}{4\pi r}.$$

This is the law of induction, which connects the appearance of electrical fields on directly with the acceleration of charge.

If it is necessary to find the induced electric fields during the motion in the field of the three-dimensional- changing vector potential, should be used the total derivative:

$$\mathbf{E}' = -\mu\, d\mathbf{A}_H / dt. \qquad (3.5)$$

The prime near the vector $\mathbf{E}$ means that we determine this field in the moving coordinate system. This means that the vector potential can have not only local, but also convection derivative, i.e., it can change both due to the change in the time and due to the motion in the three-dimensional changing field of this potential. In this case relationship (3.5) can be rewritten as follows:

$$\mathbf{E}' = -\mu \frac{\partial \mathbf{A}_H}{\partial t} - \mu(\mathbf{v}\nabla)\mathbf{A}_H,$$

where $\mathbf{v}$ - speed of the prime system.

Convective part of the force, which acts on the charge in the moving system,

$$\mathbf{F}'_{v,1} = -\mu e(\mathbf{v}\nabla)\mathbf{A}_H.$$

This force depends only on the gradients of vector potential and charge rate.

The charge, which moves in the field of the vector potential of with the speed of, possesses potential energy [4]

$$W = -e\mu(\mathbf{v}\mathbf{A}_H).$$

Therefore must exist one additional force, which acts on the charge in the moving coordinate system, namely:

$$\mathbf{F}'_{v,2} = -\mathrm{grad}\, W = e\mu\, \mathrm{grad}(\mathbf{v}\mathbf{A}_H).$$

Thus, the value $(\mathbf{v}\mathbf{A}_H)$ plays the same role, as the scalar potential φ, whose gradient also gives force.

The most simply ponderomotive action of electromagnetic fields on it is possible to show based on the example of superconductors.

The macroscopic electrodynamic properties of superconductors are described by the phenomenological equations of London:

$$\frac{d\mathbf{j}}{dt} = \frac{1}{\mu_0 \lambda_L^2}\mathbf{E}, \qquad (3.6)$$

$$\Delta\mathbf{H} = \frac{1}{\lambda_L^2}\mathbf{H} = 0. \qquad (3.7)$$

Here $\mathbf{E}$, $\mathbf{H}$, $\mathbf{j}$ - electrical, magnetic fields and current density, $\lambda_L = \sqrt{\frac{m_0}{\mu_0 n e_0}}$ - depth of penetration of magnetic field into the superconductor.

Equations give the connection between the currents and the fields in the superconductors.

Taking (3.4) into account, we obtain from (3.6) and (3.7) that

$$\mathbf{j} = ne\mathbf{v} = \frac{1}{\lambda_L^2}\mathbf{A} = \frac{1}{\lambda}\mathbf{H}_0, \qquad (3.8)$$

where $\mathbf{v}$ - the electron velocity, and $\mathbf{H}_0$ - the tension of magnetic field on the surface of superconductor.

If we take x the component of magnetic field and y the component of current density, then, taking into account (3.6), (3.8) we will obtain:

$$F'_{v,2,z} = \frac{2\mu_0}{n\lambda_L} H_{0,x}^2 e^{-\frac{2z}{\lambda}}. \qquad (3.9)$$

Relationship (3.9) determines the force, which acts on the single electron in the region of the depth of penetration of magnetic field. When magnetic field variable $H_x = H_{o,x}\sin\omega t$ i.e. currents on the surface of superconductor are induced with the aid of the external variable electrical fields on the incident electromagnetic wave, relationship (3.9) will be rewritten:

$$F'_{v,2,z} = \frac{2\mu_0}{n\lambda_L} H^2_{0,x} \sin^2 \omega t \; e^{-\frac{2z}{\lambda}}.$$

Taking into account this relationship, the element of force, which acts on the single surface with thickness dz in the direction of axis z, is determined by the relationship

$$dF'_{v,2,z} = \frac{2\mu_0}{n\lambda_L} H^2_{0,x} \sin^2 \omega t \; e^{-\frac{2z}{\lambda}} dz \qquad (3.10)$$

By integrating relationship (3.10) on the coordinate z and by averaging over the time, we will obtain the composite force, which acts on the single square of the surface of the superconductor:

$$F_\Sigma = \frac{1}{2}\mu_0 H^2_{0,x}. \qquad (3.11)$$

Thus, the force, which acts on the single area of superconductor, with the drop on it EM wave is equal to the specific energy of the magnetic field of this wave. The electrical and magnetic fields EM wave in the free space are connected with the relationship

$$\frac{E}{H} = \sqrt{\frac{\mu_0}{\varepsilon_0}} = Z \qquad (3.12)$$

where Z - wave drag of free space. From (3.11) and (3.12) follows

$$F_\Sigma = \mu_0 H_0^2 = \varepsilon_0 E_0^2.$$

Thus, the pressure, which renders EM wave with its drop on the superconductor, it is equal to the value of its specific energy. This situation is characteristic for the case of the total reflection EM wave from the surface, on which it falls, since the superconductor in the version EM examined wave does not absorb.

Phenomenological approach to the solution of the problem of the ponderomotive action of electromagnetic fields on examined in the monograph [6].

Let us examine the plane linearly polarized electromagnetic wave, which is extended to the side of the negative values z.

$$E_x = E\cos(\omega t - kz); \quad E_y = 0;$$
$$E_z = 0; \quad H_z = 0; \quad H_x = 0; \quad ,$$
$$H_y = E\sqrt{\frac{\varepsilon_0}{\mu_0}}\cos(\omega t - kz).$$

where $k = \frac{2\pi}{\lambda} = \frac{\omega}{c}$ - wave number, $c = \frac{1}{\sqrt{\mu_0\varepsilon_0}}$ - the speed of light in the vacuum.

We will use the system of the Maxwellian tensions [3]. If wave is incident on surface, then we obtain for the components of stress tensor:

$$T_{xx} = \frac{1}{2}\varepsilon_0 E_x^2 - \frac{1}{2}\mu_0 H_y^2 = 0$$

$$T_{yy} = -\frac{1}{2}\varepsilon_0 E_x^2 + \frac{1}{2}\mu_0 H_y^2 = 0$$

$$T_{zz} = -\frac{1}{2}\varepsilon_0 E_x^2 - \frac{1}{2}\mu_0 H_y^2 = -\varepsilon_0 E_x^2 \cos^2(\omega t - kz)$$

Normal component of tensor of tensions, equal to the force gradient, which acts on the single surface, comprises

$$F_0 = T_{zz} = -\varepsilon_0 E_x^2 \cos^2(\omega t - kz).$$

This force is directed to the side of plane, on which is incident the wave.

If the incident wave is not completely absorbed by plane, then with the calculation of tension should be considered the wave reflected.

$$E_{x(in)} + E_{x(ref)} = (E_{(in)} + E_{(ref)})\cos\omega t$$
$$H_{y(in)} + H_{y(ref)} = \sqrt{\frac{\varepsilon_0}{\mu_0}}(E_{(in)} + E_{(ref)})\cos\omega t$$

In this case the average values of the components of stress tensor will be written down:

$$\overline{T}_{xx} = \frac{1}{2}\varepsilon_0(E_{(nad)} + E_{(ref)})^2 - \frac{1}{2}\varepsilon_0(E_{(in)} - E_{(ref)})^2 = \varepsilon_0 E_{(in)}E_{(ref)}$$
$$\overline{T}_{yy} = -\frac{1}{2}\varepsilon_0(E_{(nad)} + E_{(ref)})^2 + \frac{1}{2}\varepsilon_0(E_{(in)} - E_{(ref)})^2 = \varepsilon_0 E_{(in)}E_{(ref)}$$
$$\overline{T}_{zz} = -\frac{1}{2}\varepsilon_0(E_{(nad)} + E_{(ref)})^2 - \frac{1}{2}\varepsilon_0(E_{(in)} - E_{(ref)})^2 = \frac{1}{2}\varepsilon_0(E^2_{(in)} + E^2_{(ref)})$$

Consequently, the unit power, which acts on the surface, will be equal

$$F_0 = -\frac{1}{2}\varepsilon_0 (E^2_{(in)} + E^2_{(ref)})$$

Thus, pressure on the surface depends on the relationship between the falling and reflected wave. Let us introduce this coefficient as

$$K = \frac{E^2_{(in)}}{E^2_{(ref)}}.$$

Then expression for the force gradient is written down

$$F_0 = \frac{1}{2}\varepsilon_0 E^2_{(in)}(1-K).$$

From the given relationships it is evident that the force, which acts on the completely reflecting surface, is two times more than force acting on the completely absorbing surface. But these forces are not great. If the power drops to 3 W on the surface, then the pressure exerted on the completely absorbing surface is 10^{-8} N, and the pressure exerted on the completely reflecting surface will be equal to $2\text{x}10^{-8}$ N. And even with a power increase 30 kW, the pressure is only 10^{-4} N and $2\text{x}10^{-4}$ N, respectively.

IV. Engine With The Domestic Spending Of The Wave Energy

Let us take square metallic plate by thickness d and length of edge L and will connect the voltage source to it U. If we the specific resistance of the metal of plate early ρ, i.e., impedance are determined by relationship $R = \rho\frac{L}{S} = \rho\frac{L}{dL} = \rho\frac{1}{d}$ and will not depend on the length of the edge of square. In this case it is accepted to speak about the resistance, which is fallen to the single square of surface. The tension of electric field on the surface of plate and inside it will be equal $E = \frac{U}{L}$, and the current, which flows through the plate, it will comprise $I = \frac{Ud}{\rho}$. Current density in the plate in this case will be equal $j = \frac{I}{S} = \frac{E}{\rho}$.

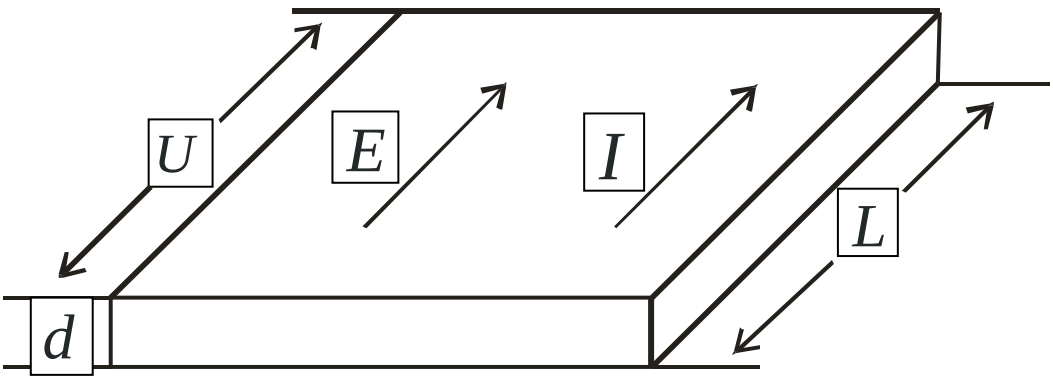


Fig. 1: Fields and currents in the square metallic plate

If there is an electromagnetic wave, which falls to the metallic surface, then the case, when in connection with the presence of skin effect wave penetrates only to the specific depth, occurs. If there isa half-space, when the thickness of plate to approach infinity, then complex depth of penetration is introduced

$$\delta_к = \frac{1}{H_T(0)\int_0^\infty H_T(z)dz} = \delta_1 + i\delta_2,$$

where $H_T(0)$ - the tangential component of the magnetic field of wave on the surface, and coordinate z is directed into the depths of the metal.

Reactive and active components of surface impedance in this case are written

$$X = \omega\mu_0\delta_1, \quad R = \omega\mu_0\delta_2.$$

Value R represents the active component that falling to the single square of surface of surface resistance.

If the wave drag of free space $Z = \sqrt{\frac{\mu_0}{\varepsilon_0}}$ is considerably more than R, that this wave practically completely is reflected from this surface.

But if is posed the problem of the total absorption of the incident wave by the assigned surface, then should be organized this surface whose $Z = R$, A $X = 0$.

Let us examine the shortened out waveguide, on which is propagated EM wave (Fig. 2.)

Fig. 2: Shortened out waveguide

If metallic plate with the high conductivity (for example copper) is the end wall of waveguide, then wave practically completely will be reflected from this wall. But if the absorbing plate with the properties assigned above is used as the end wall, then wave will be completely absorbed by this wall. Specifically, these cases are examined in the previous division, when was calculated the specific pressure of the wave, which falls on the surface with different properties.

Let us examine the case, when in the end of the waveguide is located not continuous end wall, but the cavity resonator, connected with the waveguide with opening in this wall (Fig. 3.).

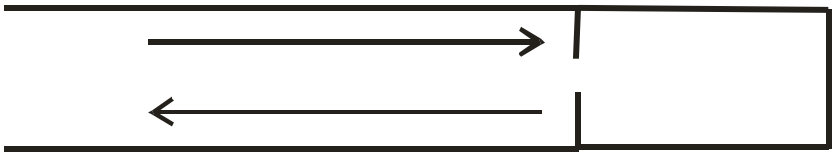


Fig. 3: Waveguide, loaded with the resonator

The processes, proceeding in this system are known [7]. At the initial moment of the time, when in the resonator still were not established the fluctuations, the wave incident to the partition, whose frequency wound to the resonance frequency of resonator, practically completely is reflected from the partition. With an increase the amplitude of fluctuations in the resonator through the opening in the partition begins to be emitted the reverse wave, which begins to compensate the incident wave. And in the steady-state regime the wave, which emerges from the resonator through the opening in the partition, completely compensates the incident wave, and resonator proves to be that coordinated with the waveguide.

In this case entire power, betrayed on the waveguide, is absorbed in the resonator, and the amplitude of the fluctuations EM wave in the resonator occurs Q once more than in the waveguide, where Q the quality of resonator. This they will indicate that the pressure on the walls of resonator, exerted EM wave, will be Q^2 once more than in the waveguide, since the pressure of wave on the walls of resonator is proportional to the square of electric field. This circumstance gives the possibility to create engine with the domestic spending of wave energy (Fig. 4).

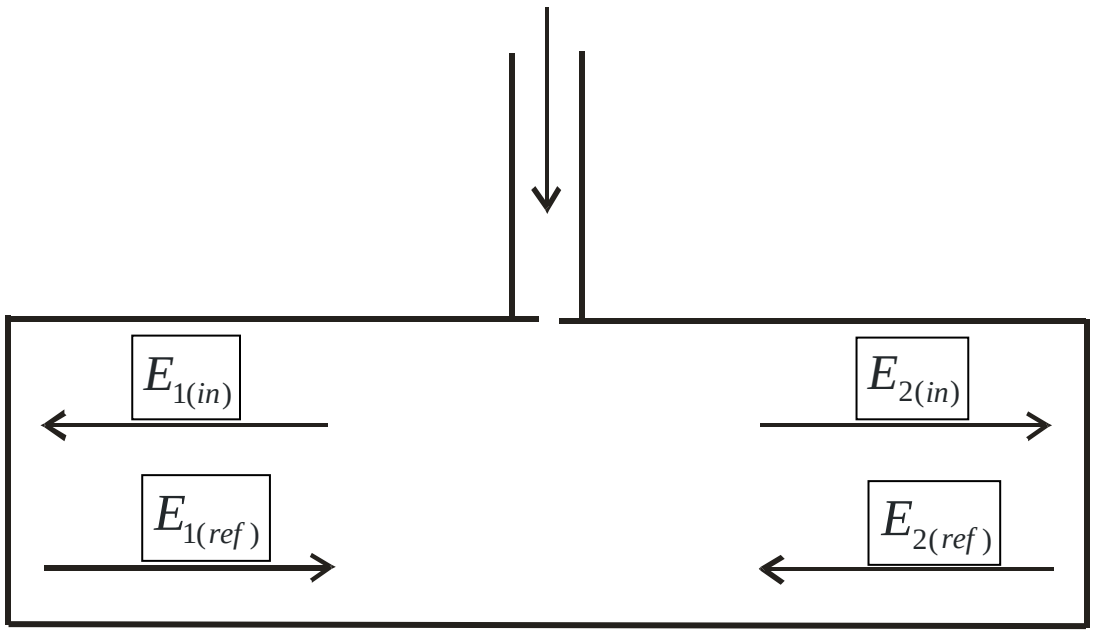


Fig. 4: Schematic of engine with the domestic spending of the wave energy

Engine consists of the cavity resonator, energy into which is introduced with the aid of the waveguide. Pointers in the diagram depicted the electric fields, falling and reflected from the opposite end walls of resonator. The surface resistance of end walls should be selected so that the reflection coefficients from these walls strongly would differ. Then the force, which acts on the wall, reflection coefficient in which is considerably above, it will be considerably more than in opposite wall, in the direction of this wall will be directed the thrusts of engine.

Let us examine the concrete example: If by the waveguide delivered power 3 W, then the pressure, exerted to its metallic end wall (Fig. 2), early $2x10^{-8}$ N. In the resonator this pressure increases Q^2. In the case of using the normal metals, such as copper and silver, for the cavity resonators are accessible the values of the quality of order 10^4 [7], therefore with the power of generator 3 W the accessible values of thrusts they will compose order 2 N, and with the power of generator 3 kW this value will compose $2x10^3$ N. In order to decrease the influence on the quality of the resonator of end wall with the increased surface resistance, should be increased the length of resonator.

V. Conclusion

At the basis of reactive thrust the law of momentum conservation lies. If from the closed system in some direction is ejected work substance, for example mass, then there is always a recoil momentum, which is reactive thrust. In the photon engines work substance are electromagnetic (EM) waves. Before the appearance of works the description of engines of the type EmDrive were not known the jet engines, in which there is no ejection of work substance. The electromagnetic waves, which outside engine do not leave, are work substance in the engines of such type, but is formed standing wave in the resonator. The works, carried out by the Chinese scientists, who installed this engine on the satellite, they proved its fitness for work. However, the theoretical substantiation of the work of such engines up to now is absent. In the proposed article the attempt to find the physical substantiation of their work is made.

References Références Referencias

1. Бурдаков В., Данилов Ю. - Ракеты будущего. - М.: Атомиздат, 1980. с. 138.
2. Curtis G. Callan, Jr. (1982). «Dyon-fermion dynamics». Phys. Rev.*D* 26 (8): 2058–206
3. Тамм И. Е. Основы теории электричества М.: Наука, 1989 - 504 с.
4. Фейнман Р., Лейтон Р., Сэндс М. Фейнмановские лекции по физике. М: Мир, 1977.
5. Сидорович А. М. К бинарно-инверсной интерпритации уравнений Максвелла и индукционных явлений. Весщ АН БССР. Сер фізм.-мат. Навук, 1980, №3, с. 126.
6. *Пондеромоторное действие электромагнитного поля (теория и приложения). Под ред. Р. А. Валитова. М., «Сов. Радио», 1975, 232 с.*
7. *Менде Ф. Ф., Бондаренко И. Н., Трубицын А. В. Сверхпроводящие и охлаждаемые резонансные системы, Киев, Наукова думка, 1978, 271 с.*

Global Journal of Science Frontier Research: a
Physics and Space Science
Volume 18 Issue 7 Version 1.0 Year 2018
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4626 & Print ISSN: 0975-5896

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GJSFR-A Classification: *FOR Code: 020302*

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I. Introduction

Modern Theoretical Physics is undergoing a "Paradigmatic Shift" from its old 'Material-Causal' Paradigm underlying both RT and QM to its new 'A-Causal Computation' (ACC) Paradigm of the CUFT; This Paradigmatic Shift is quite significant in that it revises our basic understanding of the physical universe – i.e., its origination- sustenance- constant "dissolution"-re-production- and evolution- based on the singularity of the Universal Consciousness Reality which computes every exhaustive spatial pixel in the universe at every minimal time-point: "c^2 /h" = 1.36^{-50} sec', comprising an extremely rapid series of 'Universal Simultaneous Computational Frames' (USCF's). Hence, it was shown that according to this new CUFT's ACC Paradigm the physical universe was not "caused" by an initial "Big-Bang" nuclear explosion – since there cannot exist any 'material-causal' physical interaction between any two (or more) exhaustive spatial pixels in the universe, e.g., at any single- or multiple- USCF's frames! Instead, the new ACC Paradigm postulates that the whole universe including every exhaustive spatial pixel comprising it (e.g., at any minimal time-point USCF's frame/s) is being computed simultaneously by the singular Universal Computational Principle (UCP) at each consecutive USCF's frame/s, "dissolves" back into this singular UCP "in-between" any two consecutive USCF's frames, and is being "re-created" and evolved at each consecutive USCF's frame/s! Therefore, the new emergent picture of the universe is one in which "time", "space", "energy" and "mass" merely represent secondary computational by-products of the singular Universal Consciousness Reality which singularly exists both "in-between" any two consecutive USCF's frames (e.g., without the presence of any physical universe) and also solely computes every exhaustive spatial pixel in the universe "during" each consecutive USCF's frame/s. The CUFT has received initial empirical validation based on the confirmation of one of its "differential-critical" predictions associated with the findings of the "Proton-Radius Puzzle" (Bernauer & Pohl, 2014).The current article (Epilogue) is attempting to extrapolate from the establishment of the CUFT's as a new satisfactory 'ACC' Paradigm (of Twenty-First century Theoretical Physics) towards a possible effect of Individual Human Consciousness on the newly discovered Universal Consciousness Reality's continuous production-dissolution- sustenance- and evolution- of the entire physical universe (at every minimal time-point USCF's frame/s).

a) Can Human Consciousness Affect the Cosmos?

According to Relativity Theory, Human Consciousness may manifest through the relativistic observer's *measurement* of any given space-time, energy-mass object (or event); However, in this instance, Human Consciousness is "separate" from any such given 'space-time' or 'energy-mass' object or event and it does not alter the physical properties of any such given physical (space-time, energy-mass) object or event. In the case of Quantum Mechanics, Human Consciousness can influence the collapse of the (assumed) 'probability wave function' through the direct physical interaction between the human observer's selection of a particular given subatomic 'probe' particle which is assumed to "cause" the "collapse" of the probability wave-function; But, even in QM, the effect of this direct physical interaction between a measuring subatomic 'probe' and its affected "collapsed" 'probability wave function' does not directly relate to Human Consciousness itself but only to its selection of a particular subatomic "probe" element which affects the 'collapse' of the target's probability wave-function.

Hence, according to the "Material-Causal" Old Paradigm underlying both Relativity Theory and Quantum Mechanics, Human Consciousness cannot directly influence the physical reality, e.g., of a given relativistic (space-time, energy-mass) phenomenon or of

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a given subatomic target; However, it is suggested that with the discovery of the 'Computational Unified Field Theory' (CUFT) New 'A-Causal Computation' Paradigm, which conceptualizes the origination- sustenance- "dissolution"- and evolution of the entire physical cosmos as solely produced by the singular existence of a Universal Consciousness Reality, the role of Human Consciousness may change dramatically: Indeed, the scope and purpose of this article is to shed a new light upon the close relationship that is hypothesized to exist between this singular Universal Consciousness Reality and Human Consciousness – as potentially affecting certain aspects of the physical universe; As will be delineated below, generally the possibility of Human Consciousness to affect the Cosmos (or particular parts within it) may arise through at least two distinct avenues: a) in the case of an "expanded" Individual Human Consciousness which was postulated to function in an equivalent mode to the Universal Consciousness Reality's computation- "dissolution"- sustenance- and evolution- of every exhaustive spatial pixel in the universe, such 'expanded' Individual Human Consciousness may indeed affect any exhaustive spatial pixel in the universe (in an equivalent manner to the Universal Consciousness Reality's capacities); and b) it is herein hypothesized that "Collective Human Consciousness" (e.g., an aggregate number of Individual Human Consciousness' all geared towards focusing on a common "object", "phenomenon", or "goal" etc.) may collectively affect such single or multiple physical 'object/s', 'phenomena' or even 'goals' manifesting in the physical universe…

Specifically, an additional (new) "differential-critical prediction" of the CUFT will be identified which predicts that a "Collective Individual Human Consciousness Effort" (CIHCE) may even be involved in such "macroscopic" effects – i.e., including the possibility that the accelerated expansion of the physical universe may be associated with such "CIHCE" Individual Human Consciousness orientation (and focus).

Twenty-first century Physics is undergoing a major "Paradigmatic-Shift" from the Old 'Material-Causal' Paradigm underlying Relativity Theory and Quantum Mechanics to the New 'A-Causal Computation' Paradigm associated with the discovery of the 'Computational Unified Field Theory' (CUFT). The CUFT has been recognized as a satisfactory 'Theory of Everything' shown capable of resolving the theoretical inconsistency between RT and QM and moreover resolving a series of "Physical Conundrums" such as: 'Dark-Matter' and 'Dark-Energy', the "Arrow of Time" etc. The CUFT significant advancement in our basic understanding of the physical cosmos was marked by the CUFT's discovery of the "Universal Consciousness Reality" – which represents the only "computationally invariant" constant reality computing every exhaustive spatial-pixel in the universe both "during" each consecutive Universal Simultaneous Computational Frame (USCF) giving rise to the four basic features of "space", "time", "energy" and "mass", and also existing solely (without the presence of the physical cosmos) "in-between" each two consecutive USCF's frames. This is because (as previously shown) this new recognition of the existence of a singular permanent 'Universal Consciousness Reality' which both solely computes- "dissolves"- sustains- and evolves- every exhaustive spatial-pixel throughout the physical cosmos and transcends it by existing solely without the physical universe 'in-between' any two consecutive USCF's frames leads us to view the physical cosmos as merely a manifestation of this singular Universal Consciousness Reality… As such, the four basic features comprising each and every exhaustive spatial pixel in the physical universe are seen to represent merely a manifestation of the singularity of this Universal Consciousness Reality. Moreover, this singular Universal Consciousness Reality was shown to possess a "Supra-Spatial-Temporal" Reservoir which contains all "past", "present" and possible "future/s" USCF's frames! As such, this Supra-Spatial-Temporal Universal Consciousness (Reservoir) regards the existence- "dissolution"- sustenance- and evolution- of each and every exhaustive spatial-pixel in the cosmos as merely a manifestation of this Universal Consciousness Reality.

Thus, this article sets to test the hypothesis whereby Human Consciousness can affect certain effects in the physical universe;

II. Method

In order to test the primary hypothesis of this article whereby Human Consciousness can affect certain physical phenomena associated with the physical universe, we begin by exploring one of the recently discovered CUFT's new theoretical postulates, namely: the "Individual Human Consciousness Expansive Spectrum Hypothesis" (IHCESH); The IHCESH postulates that given the Universal Consciousness Reality's Inseparability Principle which asserts the principle "inseparability" of any past, present or future/s* USCFs' pixel/s from the Universal Consciousness Reality (abovementioned), and another "Ontological Relativism" postulate which asserted the ontological equivalence of the three States of Individual Human Consciousness (e.g., "Deep-Sleep", "Waking" and "Dream")– e.g., which indicates in the "Deep-Sleep" state there is no real "separation" between the Individual Human Consciousness and the Universal Consciousness Reality; therefore, the IHCESH postulate hypothesizes that Individual Human Consciousness can also exhibit an 'inseparable' "expanded" state in which it may function in a manner equivalent to the Universal Consciousness Reality!

In order to operationalize the Method for and experimentally testing- this IHCESH postulate's prediction regarding the possibility of Individual Human Consciousness affecting the Physical Cosmos, we also need to delineate the (previously outlined) 'Ten Hierarchical Laws of Manifestation' (THLM) associated with the Universal Consciousness Reality's computation- "dissolution"- sustenance- and evolution- of every exhaustive spatial pixel in the physical cosmos, e.g., throughout its 'Supra-Spatial-Temporal Reservoir' of all past- present- and future/s- USCF's frames; These 'Ten-Hierarchical Laws of Manifestation' (THLM) comprise of:

a) The Universal Consciousness Reality's computation of the four basic 'Physical Features' of 'space', 'time', 'energy' and 'mass'; which are organized and computed by:
b) The Universal Consciousness Reality's three Computational Dimensions, e.g., of 'Consistency', 'Framework' and 'Locus' which are computed by:
c) The 'Universal Consciousness Reality's "Universal Computational Formula" which completely integrates those four basic physical features based on the singular computational process of the Universal Consciousness Reality, which (in turn) is driven by:
d) The Universal Consciousness Reality's "Supra-Spatial-Temporal Reservoir", e.g., comprising all "past"- "present" or "future/s"*- USCF's frames comprising the entire evolution of the physical universe, which in turn is "motivated" by:
e) The Universal Consciousness Reality's "Accelerated Expansion of Consecutive USCF's Frames' Presentation"', e.g., previously delineated as negating the existence of any (purely hypothetical) "Dark-Mater" or "Dark-Energy" (assumed to "cause" the accelerated expansion of the physical universe); which in turn is "motivated" by:
f) The "Evolution of Consciousness Hypothesis" , e.g., of the progressive presentation of "inanimate", then "animate": "plants", "animals", "humans"; which leads to:
g) The Universal Consciousness Reality's "Dynamic-Equilibrium" Principle, e.g., (previously explained) which "balances" any "moral-injustice" (infliction of 'pain' or 'suffering' by one Individual Human Consciousness upon another Individual Consciousness) by allowing the 'Inflicting-Human Consciousness' to experience a proportionate 'suffering or pain' to the one it inflicted consciously upon the 'Inflicted Human Consciousness'…; This 'Dynamic-Equilibrium Principle' applies only to the "higher segment" of the 'Evolution of Consciousness' (hypothesis), namely: human beings; This 'Dynamic-Equilibrium Principle' is motivated by:
h) The Universal Consciousness Reality's motivation to express its full "Expanded Individual Human Consciousness Universal Consciousness' State"! this refers to the ultimate "goal" of the Universal Consciousness Reality to evolve the entire physical universe (which was shown previously to merely represent a "camouflaged" manifestation of the singularity of the Universal Consciousness Reality) towards a "full manifestation" of the Universal Consciousness Reality through its expression within an "expanded" 'Individual Human Consciousness' through its "Universal Consciousness State" in which Individual Human Consciousness expresses an equivalent functioning and capacities as the Universal Consciousness Reality's continuous computation- "dissolution"- sustenance- and evolution- of every exhaustive spatial-pixel in the universe (as well as its 'Supra-Spatial-Temporal Reservoir's access and potential influence etc.); this Universal Consciousness Reality may be "motivated" by its:
i) Universal Consciousness Reality's "Free-Will Hypothesis": an essential freedom of the Universal Consciousness Reality to express- create- evolve- "dissolve"- and evolve- any exhaustive spatial-pixel in the universe, any moral-motivation, any physical law etc. throughout its 'past', 'present' and 'future/s*'- 'Supra-Spatial-Temporal Reservoir' USCF's; Finally, the Universal Consciousness Reality's 'Free-Will Hypothesis' arises from:
j) Universal Consciousness Reality's "Good-Will" Hypothesis: a basic postulate asserting the essential "good", "benevolent", "life-giving" impulse of this singular Universal Consciousness Reality – i.e., to create, sustain and evolve all inanimate, animate: plants, animals and human-beings, and lead them towards ever more expansive expression and manifestations of its inherent Universal Consciousness Reality… it is herein hypothesized that there exists a "primal" 'Good-Will ' Motivation of this singular Universal Consciousness Reality to 'create'- ('dissolve')-' re-create' and 'evolve'- the entire physical universe as a growing manifestation of its intrinsic motivation to manifest increasingly expansive expressions of its basic Moral, Universal Consciousness nature – i.e., at each and every exhaustive spatial-pixel comprising any 'past', 'present' or 'future/s'* USCF's frames, i.e., including its accelerated increase in the number of spatial-pixels comprising each of its consecutive USCF's frames (being presented) and towards its evolutionary manifestations of increasingly expansive 'inanimate', then 'animate': plants, animals, humans – and leading up to the fully "expanded" "Individual Human Consciousness' Universal Consciousness State".

These 'Ten-Hierarchical Laws of Manifestation' explicate the manner in which the singular Universal Consciousness Reality manifests each and every

exhaustive spatial pixel in the physical universe – i.e., as directed (and "motivated") by ever more expansive "circles" of expression of this singular Universal Consciousness Reality; Therefore, the abovementioned delineation of these 'Ten-Hierarchical Laws of Manifestation (THLM) is "important" – e.g., in terms of its outlining of the possible effect that Human Consciousness may have on the physical Cosmos:

As mentioned (above), the series of CUFT's Theoretical Postulates (all) point at the above mentioned "inseparability" of Individual Human Consciousness from the Universal Consciousness Reality: The "Universal Consciousness Reality's Inseparability" Postulate indicated that since at any single- or multiple- USCF's frame/s – all exhaustive spatial pixels comprising any such single/multiple USCF's frame/s are solely produced- "dissolved"- sustained- and evolved- singularly by this Universal Consciousness Reality; and the IHCESH postulate indicated that due to the potential of "expanded" Individual Human Consciousness to function in a manner that it "equivalent" to the Universal Consciousness Reality, therefore in both its Individual Human Consciousness "Expanded State", as well as through a potential to affect the Cosmos through a "Collective Human Consciousness Focus"[CHCF] delineated below – it should be possible for Individual Human Consciousness to affect changes in the physical universe:

a) It is suggested that the "expanded" Individual Human Consciousness" can equivalently affect each exhaustive spatial pixel/s throughout the physical universe, i.e., in terms of its computation of each exhaustive spatial pixel's four physical features (of 'space', 'time', 'energy' and 'mass').

b) This potential capacity of the "expanded" Individual Human Consciousness to affect the computation of each of the universe's four physical features (of 'space', 'time', 'energy' and 'mass') is derived from its equivalent capacity (e.g., to the Universal Consciousness Reality – of which it is truly "inseparable") to compute- or affect- the Universal Consciousness Reality's Three 'Computational Dimensions', (e.g., of 'Consistency', 'Framework' and 'Locus');

c) Which, in turn is derived from such an "expanded" Individual Human Consciousness (e.g., or indeed of a 'Collective Human Consciousness Focus', as will be delineated below) – to carry on- or affect- the Universal Consciousness Reality's capacity to compute its "Universal Computational Formula" which completely integrates the four basic physical features (of 'space',' time', 'energy' and 'mass') per each exhaustive spatial pixel/s comprising the physical cosmos; This implies that an "expanded" Individual Human Consciousness can operate (hypothetically) via the same 'Universal Computational Formula' which can therefore compute- affect- "dissolve"- and 'evolve' any exhaustive spatial pixel throughout the entire physical universe.

d) Furthermore, it is hereby hypothesized that such an 'Expanded Individual Human Consciousness' or 'Collective Human Consciousness Effort' – may also possess access to any of the Universal Consciousness Reality's "pool" of all 'Supra-Spatial-Temporal Reservoir' of any past' present- or 'future/s*' USCFs' exhaustive spatial pixels... (This hypothetical access of the 'Expanded Individual Human Consciousness' or 'Collective Human Consciousness Focus' to all exhaustive 'past', 'present' or 'future/s'* USCFs' pixels raises an important question regarding the potential of Human Consciousness to affect changes in any given (individual or even Collective) 'past', 'present' or 'future/s' occurrences – such as through conscious human motivations or actions such as: "repentance", "forgiveness" etc. which will be further discussed below and subsequently..)

e) Interestingly, precisely connected to this potential capacity of 'Expanded Individual Human Consciousness' or 'Collective Human Consciousness Focus' to alter- or revise- or affect- any 'past', 'present', or 'future/s'* USCF's frames' exhaustive spatial pixels' occurrences – is its intrinsic connection with the Universal Consciousness Reality's 'Dynamic-Equilibrium' Principle'; this is because tied with this Universal Consciousness Reality's 'Dynamic Equilibrium' Moral Principle's inherent tendency to "balance" any "moral-imbalance", i.e., any infliction of 'pain' or 'suffering' by one Individual Human Consciousness upon another Individual Consciousness – such that the degree of pain/suffering experienced by an "Inflicted" Individual Consciousness one Individual Consciousness as to be experienced by the "Inflicting" Consciousness by another Consciousness; is both the Individual Human Consciousness' selection of (moral/immoral) actions – which determines the Universal Consciousness Reality's "balancing" Dynamic-Equilibrium "correction" of the 'Inflicting Consciousness' future occurrences; as well as the potential of that 'Inflicting-Consciousness' to undergo a "self-correction/repentance" conscious action – which can potentially "undo" any such (negative) 'balancing/correcting' occurrences potentialities of the Universal Consciousness Reality towards that 'Inflicting-Consciousness'.

III. Results & Discussion: Experimental Predictions & Theoretical Implications

Some of the concrete Experimental Predictions of this new CUFT's realization regarding the "intimate" connection between Individual Human Consciousness and the Universal Consciousness Reality are:

a) It is expected that certain 'Experimental Conditions' could be set to test the CUFT's hypothesis wherein a negative 'Moral Choice' can trigger a negative 'balancing/correction' action of the Universal Consciousness Reality; and equally that a 'repentance' action of that Inflicting pain Consciousness can "cancel" any such negative consequences.

b) It is also expected that Experimental Conditions can be devised to test the capacity of an 'Expanded Human Consciousness' to affect any given Physical System's particular spatial-pixels, e.g., such as for instance its capacity to affect remote System's selection of "random occurrences" (automatic computerized selection of certain outcomes);

c) It is also predicted that a particular "Collective Human Consciousness' Focus" (CHCF) can indeed affect certain (macroscopic) "relativistic" phenomenon or (microscopic) 'quantum' effects; one of the possible manifestations of this CHCF hypothesis is testing to see whether there exists a change in the empirically observed "rate of accelerated expansion" of the physical universe – that may be affected by such CHCF as the "Jewish New Year's" Intensive Prayers… May it be possible that there exists a direct correlation between the CHCF associated with this 'Jewish New Year's' Intensive Prayers period of time and a (positive) change in the rate of accelerated rate of the universe's expansion?! In other words, can empirical measurements be carried out which may indicate that the universe's accelerated rate of expansion – does not occur based on a "continuous-monotonic" rate (e.g., all along the year) but is rather typified by a non-continuous acceleration of this Universal Expansion specifically occurring at the time of the Jewish New Year's Prayers? If so, than this would be one of the direct empirical validations of the impact of Human Consciousness on the Cosmos.

The scope and purpose of this article was to elucidate the close connection that exists between Human Consciousness and the Universal Consciousness Reality, e.g., based on the CUFT's elucidation of several principles: first, it was shown that based on the "Universal Consciousness Inseparability Principle" and the "Individual Human Consciousness Expansive Spectrum Hypothesis" (IHCESH) postulates – that it should be possible to test (particular) effects of an 'Expanded Individual Human Consciousness' upon otherwise "random" (automatic computerized) occurrences; Second, it was hypothesized that based on the Universal Consciousness Reality's 'Dynamic-Equilibrium Principle' certain Experimental Conditions could be devised which would allow to test the specific prediction that the selection of particular "Immoral Action/s" by an 'Inflicting-Consciousness' upon another 'Inflicted-Consciousness' – can be shown to 'trigger' a proportionate "correction" (by the hypothetical Universal Consciousness Reality) which would manifest as the occurrence of proportionate (negative) consequences by the Inflicting Human Consciousness; and that a 'repentance' correcting action (or motivation) by this 'Inflicting-Consciousness' would result in a "cancelling" or "revision" of the otherwise negative consequences experienced by the Inflicting Consciousness; Finally, that particular 'Experimental Conditions' can be designed to test the CUFT's prediction regarding the potential effect of such 'Collective Human Consciousness Focus' upon the empirically observed accelerated expansion of the physical universe – e.g., such as for instance hypothetically observing a change in this rate of accelerated expansion of the cosmos associated with the 'Jewish New Year's' intensive 'Collective Human Consciousness Focus' prayers.

To the extent that such empirical predictions of the CUFT can be validated experimentally it would evince that the CUFT's assertion regarding the inseparability of Individual Human Consciousness from the Universal Consciousness Reality, and its inherent potential to "expand" such that it can function in a somewhat equivalent manner to this Universal Consciousness Reality's continuous computation- "dissolution"- sustenance- and evolution- of every exhaustive spatial pixel in the universe; as well as to the 'intimate' connection that exists between the conscious (moral) choices of an Individual (Inflicting) Human Consciousness and the Universal Consciousness Reality's 'Dynamic-Equilibrium' moral principle's "balancing" of this Inflicting Human Consciousness' future/s occurrences determination (e.g., including the possibility to 'cancel' such potential negative consequences through the 'Inflicting' Consciousness' repentance…

IV. Dedication

This article is dedicated to my dear beloved (diseased) Mother, Dr. Tirza Bentwich whose love and faith in me have nurtured my inquisitive (awe-driven) quest to find Truth; It is also dedicated to Humanity – may this scientific work foster future Scientific Research and Understanding revealing the underlying Unity of the Universal Consciousness Reality's oneness behind all creation, and specifically may it encourage Science to unravel the full Human Potential of its Expanded

Individual Consciousness and its (positive) Collective Human Consciousness' good-seeking qualities and potentialities.

References Références Referencias

1. Bentwich, J. (2012a) "Harmonizing Quantum Mechanics & Relativity Theory". Theoretical Concepts of Quantum Mechanics, Intech (ISBN 979-953-307-377-3), Chapter 22, pp. 515-550.
2. Bentwich, J. (2012a) "Harmonizing Quantum Mechanics and Relativity Theory". Theoretical Concepts of Quantum Mechanics, Intech (ISBN 979-953-307-377-3), Chapter 22, pp. 515-550.
3. Bentwich, J. (2012b) "Theoretical Validation of the Computational Unified Field Theory". Theoretical Concepts of Quantum Mechanics, (ISBN 979-953-307-3773), Chapter 23, pp. 551-598.
4. Bentwich, J. (2013a). "The Theoretical Ramifications of the Computational Unified Field Theory". Advances in Quantum Mechanics (ISBN 978-953-51-1089-7), Chapter 28, pp. 671-882.
5. Bentwich, J. (2013b). The Computational Unified Field Theory (CUFT): A Candidate Theory of Everything. Advances in Quantum Mechanics (ISBN 978-953-51-1089-7) Chapter 18, pp. 395-436.
6. Bentwich, J. (2014a). Critical Empirical Validation of the 'Computational Unified Field Theory' (CUFT) vs. Quantum & Relativistic Models. Selected Topics in Applications of Quantum Mechanics (ISBN 978-953-51-2126-8).
7. Bentwich, J. (2014c) What if Einstein was Right? Amazon Kindle Book Store.
8. Bentwich, J. (2015). On the Geometry of Space, Time, Energy & Mass: Empirical Validation of the Computational Unified Field Theory. Proceedings of Vigier IX – Unified Mechanics: Natural Science Beyond the Veil of Space time (Baltimore, Maryland).
9. Bentwich, J. (2016) The 'Computational Unified Field Theory': A Paradigmatic Shift. Research & Reviews: Journal of Pure & Applied Physics.
10. Bentwich, J. (2017a) The Computational Unified Field Theory: Could 'Dark Matter' & 'Dark Energy' be "Superfluous"? Research & Reviews: Journal of Pure & Applied Physics, Special Issue: The Computational Unified Field Theory (CUFT)- A Paradigmatic Shift in 21st Century Physics.
11. Bentwich, J. (2017b) The Computational Unified Field Theory: Explaining the Universe from "Without". Research & Reviews: Journal of Pure & Applied Physics, Special Issue: The Computational Unified Field Theory (CUFT)- A Paradigmatic Shift in 21st Century Physics.
12. Bentwich, J. (2017c). The Computational Unified Field Theory: A New 'A-Causal Computation' Physics. Research & Reviews: Journal of Pure & Applied Physics, Special Issue: The Computational Unified Field Theory (CUFT)- A Paradigmatic Shift in 21st Century Physics.
13. Bentwich, J. (2017d). The 'Computational Unified Field Theory' (CUFT) May Challenge the 'Big-Bang Theory'. Research & Reviews: Journal of Pure & Applied Physics, Special Issue: The Computational Unified Field Theory (CUFT)- A Paradigmatic Shift in 21st Century Physics.
14. Bentwich, J. (2017e). Can the 'Computational Unified Field Theory' (CUFT) Challenge the Basic Laws of Conservation? Research & Reviews: Journal of Pure & Applied Physics, Special Issue: The Computational Unified Field Theory (CUFT)- A Paradigmatic Shift in 21st Century Physics.
15. Bentwich, J. (2017f). The Computational Unified Field Theory: Time Reversal May be Possible. Research & Reviews: Journal of Pure & Applied Physics, Special Issue: The Computational Unified Field Theory (CUFT)- A Paradigmatic Shift in 21st Century Physics.
16. Bentwich, J. (2017g). The Computational Unified Field Theory (CUFT) Transcends Relativity's Speed of Light Constraint. Research & Reviews: Journal of Pure & Applied Physics, Special Issue: The Computational Unified Field Theory (CUFT)- A Paradigmatic Shift in 21st Century Physics.
17. Bentwich, J. (2017h). The Computational Unified Field Theory's New Physics: Transcending Space, Time and Causality. Research & Reviews: Journal of Pure & Applied Physics, Special Issue: The Computational Unified Field Theory (CUFT)- A Paradigmatic Shift in 21st Century Physics.
18. Bentwich, J. (2017i). A "Supra-Spatial-Temporal Universal Consciousness Reality'. Research & Reviews: Journal of Pure & Applied Physics, Special Issue: The Computational Unified Field Theory (CUFT)- A Paradigmatic Shift in 21st Century Physics.
19. Bentwich, J. (2017j). A New Science: An Infinite Omniscient Dynamic-Equilibrium Universal Consciousness Reality. Research & Reviews: Journal of Pure & Applied Physics, Special Issue: The Computational Unified Field Theory (CUFT)- A Paradigmatic Shift in 21st Century Physics.
20. Bentwich, J. (2017k). The Computational Unified Field Theory (CUFT) Challenges the Second Law of Thermodynamics. Research & Reviews: Journal of Pure & Applied Physics, Special Issue: The Computational Unified Field Theory (CUFT)- A Paradigmatic Shift in 21st Century Physics.
21. Bentwich, J. (2017l). The Computational Unified Field Theory (CUFT) Challenges Darwin's 'Natural Selection Principle'! Research & Reviews: Journal of Pure & Applied Physics, Special Issue: The

Computational Unified Field Theory (CUFT)- A Paradigmatic Shift in 21st Century Physics.

22. Bernauer & Pohl (2014). The Proton Radius Puzzle. Scientific American, 310 (2), p. 20-24.
23. Born, M. (1954).The statistical interpretation of quantum mechanics, Nobel Lecture, December 11,
24. Brumfiel, G. (2006). Our Universe: Outrageous fortune. Nature, Vol. 439, pp. (10-12).
25. Ellis, J. The Superstring: Theory of Everything, or of Nothing? Nature, Vol. 323, No.089, pp. (595–598) (1986).
26. Giacosa, Francesco (2014). "On unitary evolution and collapse in quantum mechanics". Quanta 3 (1): 156–170. doi:10.12743/quanta.v3i1.26.
27. Greene, B. The Elegant Universe, Vintage Books, New York (2003).
28. Heisenberg, WÜber den anschaulichen Inhalt der quantentheoretischen Kinematikund Mechanik. Zeitschrift für Physik, Vol. 43 No. 3–4, pp. (172–198) (1927).

Global Journal of Science Frontier Research (A) Volume XVIII Issue VII Version I Year 2018
28

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Global Journal of Science Frontier Research: a
Physics and Space Science
Volume 18 Issue 7 Version 1.0 Year 2018
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4626 & Print ISSN: 0975-5896

Effect of Gaseous Pollutants (NO_2, SO_2 and O_3) on Cultural Heritage Materials: A Case of MFAs in Brussels, Belgium

By D.A. Workneh, A.V. Gholap & N.A. Kgabi
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Abstract- The collection of the Royal Museums of Fine Arts (MFA) of Brussels, Belgium covers a period extending from the 15th to the 21st centuries. It provides overview of western arts with remarkable ensembles of works of artists from Belgium. In the museum there a collection of paintings, sculptures, drawings and prints, it also includes, in particular through donations or deposits, items of decorative arts and furniture along with a small number of non-European works. The online catalogue currently contains over 10,000 of the most representative works of the collection. To assess the air quality inside and outside the museums the sampling campaign over a period of April 13, 2015- May 11, 2015 was performed. The gas monitoring of nitrogen dioxide (NO_2), sulphur dioxide (SO_2) and ozone (O_3) was carried out outside the building, in galleries and in showcases by means of using diffusive samplers. The concentrations of gaseous pollutants (NO_2, SO_2 and O_3) were lower inside the museums than the outside with some of them at undetectable levels inside; in addition, the levels of these gases inside the two museums were lower and below the recommended level when compared to that of other museums (in other countries). The air conditioning system inside the museums play a great role in determines the concentrations of the pollutants.

Keywords: *museum, gaseous, pollutants, indoor, outdoor.*

GJSFR-A Classification: *FOR Code: 029999*

Strictly as per the compliance and regulations of:

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I. Introduction

Air born pollutants exhibits a wide range of adverse effects on objects connected to cultural heritage. Both gaseous and particulate air pollutants are responsible for deteriorating processes. Some of these pollutants are encountered in indoor atmospheres have their main sources are in the outdoor environment and enter mainly via air exchange while other pollutants are mainly produced indoors.

Inorganic compounds such as sulphur dioxide (SO_2), nitrogen oxide (NO_2) and ozone (O_3) are the most dangerous gaseous air pollutants. Presence of SO_2 in the atmosphere may be due, as in the case of NO_X, to transport. However, the main emission source is the combustion of sulphur-containing fuels (95% go for SO_2 and 5% go for SO_3) (Geerinckx, 2003). SO_2 is a colourless, water-soluble gas. Similarly as ozone, SO_2 is responsible for the degradation of dyes and damaging of photographic material (Swan, 1981) and leather (Spedding, and Rowlands, 1971). This is the result of an oxidation reaction which causes conversion of the atmospheric SO_2 to sulphuric acid (H_2SO_4) (Pavlogeorgatos, 2003), which can damage the museum objects.

These are mostly objects that are composed of calcium carbonate ($CaCO_3$) (marble, limestone and murals), but also cellulose (paper, cotton and linen), silk, iron (Fe) and steel (Pavlogeorgatos, 2003). Paper will discolour and become brittle, textile and leather weaken and metals will become dull (Spedding and Row lands, 1971, Shahani and Wilson, 1987), Lang well, 1976). Hudson and Milner, 1961, Zeronian, 1970, 1973, Pope et al., 1986). Iron acts as a catalyst for such oxidation reactions, as well as manganese (Mn) or copper (Cu) (Whitmore, P. M. 1987).

Tropospheric ozone caused damage to the health, environment and material. Unlike in the case of most pollutants, there is no direct O_3 emission source. It is formed when sunlight is incident at different atmospheric polluting gases such as NO_X. Ozone is a highly reactive gas because of its strong oxidizing properties. It is capable to damage a variety of oxidation-sensitive materials, especially by ozonolysis reactions with unsaturated organic compounds. Colour change and fading of pigments illustrate this phenomenon. Whitmore and Cass, 1998, Giles, (1965), have investigated the effect of O_3 on a range of pigments and textile dyes. They showed that the materials are at risk only if they are exposed to O_3 for a prolonged period. The discolouration or fading of dyes occurs when organic pigments are sensitive to specific oxidation reactions (Salmon et al, 2000, Shahani, and Wilson, 1987, Newton, 1945). Additionally, O_3 causes damage to photographic material and paper (Morris et al, 1964) and reduces endurance of rubber (Camuffo, 1998).

NO_X-compounds are produced by combustion processes as a result of the oxidation of nitrogen (N_2) in the air. There are both anthropogenic and natural sources. NO_2 is a toxic, reddish brown gas and is similar to SO_2 regarding the damage to the exhibits. In humid air, it is oxidized to volatile nitric acid (HNO_3) by reaction

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with OH-radicals (Pavlogeorgatos, 2003). This acid can then induce fading of textile dyes and photographic film damage and weaken textile fibres (Worobiec et al, 2008).

In this study, we measured O_3, SO_2 and NO_2, concentration in the museum environment (inside, outside and showcase) and these results are probably very important basic information when considering the conservation of cultural property over a longer period of time.

II. Methodology

a) Sampling site

The museums are situated in the capital Brussels, Belgium in the downtown area on the Coudenberg. It is located on the city of Brussels (50.84^0 N, 4.36^0 E, 28 m a.s.l.) and it has a population of 1.187890 million.

b) Gaseous sampling: Radiello diffusive sampler

The diffusive sampler (Fondazione Salvatore Maugeri, Padova, Italy) is a closed box, usually cylindrical. It has two opposite sides, one is transparent to gaseous molecules which cross it, and are adsorbed onto the second side. The former side is named diffusive surface (S), the latter is the adsorbing surface (A) (marked with *S* and *A* in Fig. 1). The diffusive body has a cylindrical symmetry in which the adsorbing cartridge is positioned coaxially (Fig.1). The chemiadsorbing cartridges are positioned in the diffusive bodies and the whole is subsequently attached to a supporting plate, which also act as a closure. When measuring outdoors, the samplers are protected from rain by a small shelter. Sampling periods ideally range from 3 to 7 days.

Since the uptake rate of the gas molecules depends on temperature, the ambient temperature is measured simultaneously to obtain more accurate concentration values, applying a temperature dependent correction factor. After sampling, the chemiadsorbing cartridges are well sealed from ambient air and transported to the lab for analysis.

For the sampling of O_3, SO_2 and NO_2, the same diffusive body was used (code 120-1). It consists of microporous polyethylene with an average porosity of 25 ± 5 µm, opaque to light. The chemiadsorbing cartridges are compound specific. For ozone, the cartridge (code 172) is composed of silica gel coated with 4, 4'-dipyridylethylene. Upon exposure to ozone and water, both trapped in the silica gel, 4-pyridaldehyde is formed (Fig. 1). The analysis is based on colorimetry. The 4-pyridaldehyde is condensed with 3-methyl-2-benzothiazolinone hydrazone (MTBH) to obtain the corresponding aside which is yellow colored. The absorbance of the solutions is subsequently measured with UV-Visble spectrometry at a wavelength of 430 nm. By means of a calibration curve, the ozone mass is deduced (1 µg of 4-pyridylaldehyde = 0.224 µg of ozone). Finally, the average ozone concentration over the whole exposure time is calculated, applying the appropriate temperature correction. The active compound of the chemiadsorbing cartridge for NO_2 and SO_2 (code 166) is triethanolamine (TEA). NO_2 and SO_2 are adsorbed as nitrite and sulphite or sulphate ions. The diffusive body ensures that the sampling is selective for gaseous molecules. The procedure and sam[ling techniques are adapted from (Hitzenberger et al. 2006).

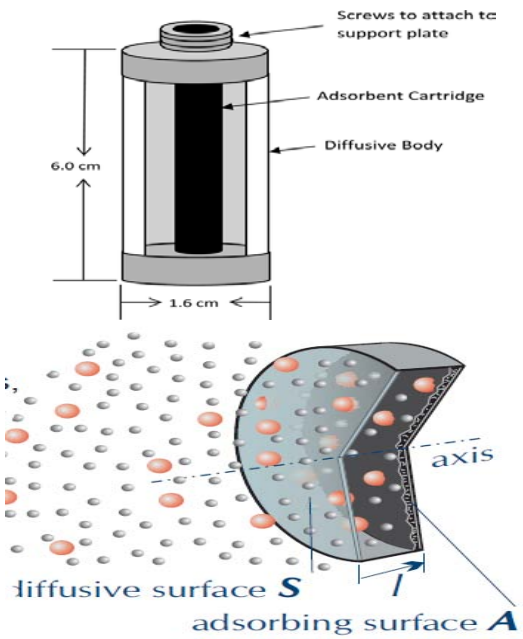


Fig. 1: The Radiello passive samplers and its Schematic of the radial sampler and Diffusion principle.

III. Result and Discussion

Both inside and outside average concentrations of pollutant gaseous such as NO_2, SO_2, and O_3 were measured in Magritte, Magritte Showcase and Reserve OB Museums of Fine Arts. Results of the analysis of investigated gaseous pollutants are summarized in Figs. 2-4

NO_2 concentrations obtained from all location inside the museums were below the detection limit defined by the United States (US) National Bureau of Standards and the Museum Environment (Thomson, G. 1986). The outside concentrations of NO_2 were found to be around 23.8 and 12.6 µg/m^3 Magritte and Reserve OB respectively. In Magritte's' Showcase, NO_2 concentration, which was inside, was below the detection limit (Table 1). Because the showcase is rather a less closed compartment within the gallery that result in a small air exchange. NO_2 is a gas with strong outdoor sources mainly from road traffic, and domestic heating for energy generation (Thomson, 1986, Kontozova-Deutsch et al 2011, Kontozova et al 2005, Ricardo et al 2015). These results also showed that NO_2 enters the museums from outdoor air and there were no

strong sources inside. In the case of Showcase, the concentration of NO_2 decreases inside because of its closed nature (Brimblecombe et al., 2001).

The indoor concentrations of SO_2 were 0.8, 0.4 and 1.5 μg/m^3 in Magritte, Reserve OB and the Magritte Showcase, respectively. SO_2 was also detected in the outdoors of the Magritte (2.4 μg/m^3) and Reserve OB (2.7 μg/m^3). SO_2 was found to be high in the display case than inside Magritte; this could be due to restricted air circulation that leads to pollutants build up over time. The decrease SO_2 concentration inside the museums was due to due to the high deposition velocity of SO_2 which leads to quick adsorption on the surface (Grontoft and Raychaudhuri, 2004)

Table 1: Indoor and outdoor mean concentrations of NO_2, SO_2 and O_3 in Museum of Fine Art.

Location	O_3 (μg/m^3)	SO_2 (μg/m^3)	NO_2 (μg/m^3)	NO_2 (ppb)	SO_2 (ppb)	O_3 (ppb)
Magritte inside	3.1	0.8	<DL	<DL	0.33	1.56
Magritte Showcase	2.1	1.5	<DL	<DL	0.56	1.04
Reserve OB. Inside	1.6	0.4	<DL	<DL	0.17	0.80
Magritte Outside	46.4	2.4	23.8	12.70	0.92	23.20
Reserve OB. Outside	70.9	2.7	12.6	6.73	1.04	35.45

In addition, the inside concentrations of O_3 were found to be much lower than the outside in all three museums. The lowest value was detected 1.6 μg/m^3 in the Reserve OB museum (Table 1). The highest concentrations of O_3 were found outside of the two museums with an average of 46.4 and 70.9 μg/m^3 Magritte and Reserve OB respectively. This might be a result of the continuous opening of the windows in the period of very high temperatures during the sampling period. These results can be also explained by the higher reactivity of ozone which also reflects rather its large deposition velocities. Meteorological parameters have an impact on ozone concentrations. Kgabi and Sehloho (2012) confirmed that there is a direct relation between ozone and temperature and wind; while, an inverse relation between ozone and relative humidity. The concentration values of all analyzed gases were higher outside the building than in the galleries. It may be argued to the fact that part of the gaseous components could have reacted with the art objects, walls, furniture, etc. or with other gases and aerosol particles present in the air and a limited air exchange. In the city main sources of ozone are traffic activities, industrial area and businesses (Kgabi, and Sehloho, 2012).

The most distinct difference between indoor and outdoor concentrations was noticed in the case of O_3 (Fig. 3). This observation applies to all sampling period and is probably due to the higher reactivity of this compound compared to the others.

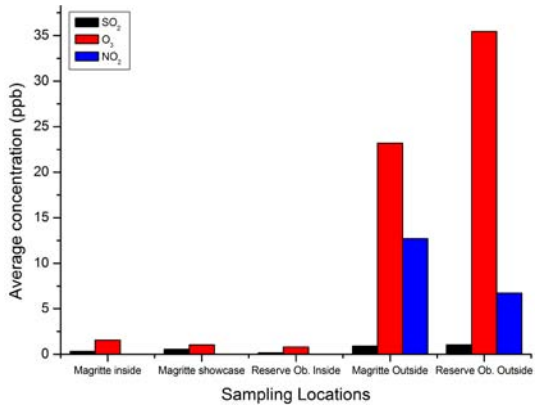
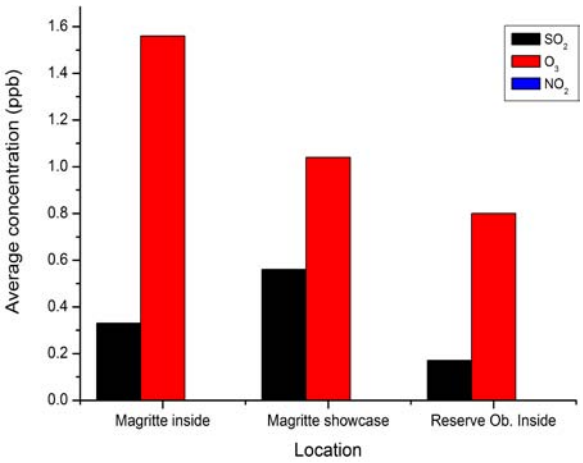
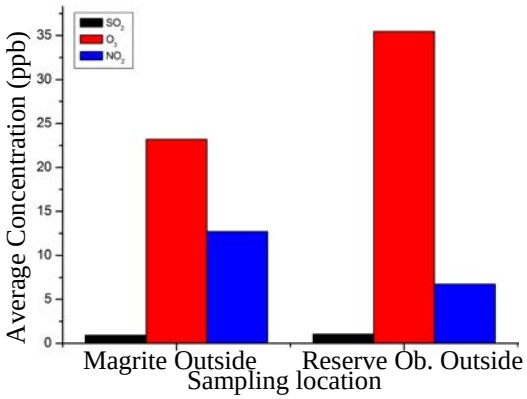


Fig. 2: Average Concentration of SO_2, NO_2 and O_3 in Museum of Fine Arts.



(a)



(b)

Fig. 3: Average Concentration of SO_2, NO_2 and O_3 inside (a) and outside (b) Magritte and Reserve OB.

In general, the levels of NO_2, SO_2 and O_3 inside the two museums are lower when compared to that others as indicated in Fig. 4. However, recommended levels of gaseous pollutants in museums are SO_2< 2 ppb, NO_2< 10 ppb and O_3< 5 ppb (Brimblecombe, 1990). Our findings showed that the level of these gaseous pollutants were below the recommended limits. This may presumably due to centrally heating, ventilation and air conditioning (HVAC) systems used in the museum, which play a significant role for protecting the museum's environment (Magritte and Reserve OB).

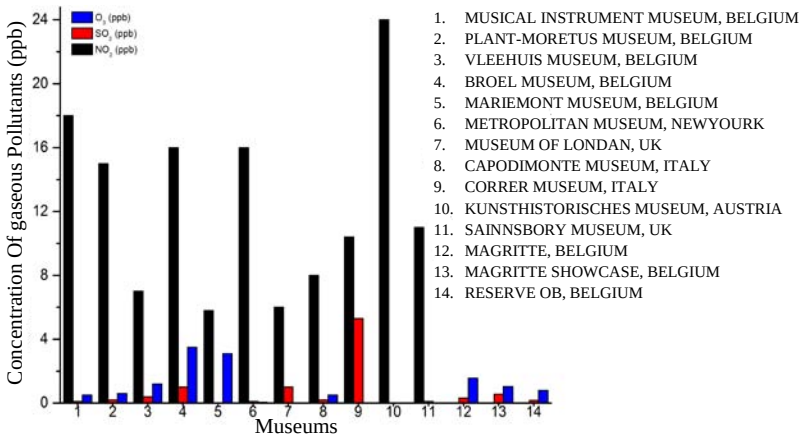


Fig. 4: Gaseous pollutants in MFAs compared with different museums.

IV. Conclusion

Passive diffusion tubes were used for sampling of NO_2, SO_2 and O_3. The results show that the concentration of the gaseous pollutants found in Magritte (NO_2 = <DL, SO_2= 0.8 µg/m^3 and O_3 = 3.1 µg/m^3) and Reserve OB (NO_2 = <DL, SO_2 = 0.4 µg/m^3 and O_3 = 1.6 µg/m^3) is below the recommended level (NO_2 = 19 µg/m^3, SO_2 = 5.2 µg/m^3 and O_3 = 10 µg/m^3). In the case of NO_2, the concentrations measured in inside Magritte and reserve OB and Magritte showcase were below the detection limit but the concentrations SO_2 and O_3 were significantly high. In practice, SO_2 and O_3 could have reacted with museum objects after inflowing from the outdoor environment, therefore their high indoor concentrations can be high worrying than less concentrations of nitrogen dioxide.

This implies that meteorological conditions i.e., wind, temperature, relative humidity and outside anthropogenic activities such as movement of vehicles and tourists had major influences on the concentrations of pollutants.

It may be argued that a museum, an exhibition space for objects with great cultural and historical value, is ideally considered to be free from internal sources of pollutants. The air pollution comes therefore primarily from outside and is transferred towards inside during the outdoor/indoor air exchange through cracks in walls or other slits in the building, opened windows, doors and ventilation systems. Outside anthropogenic activities such as movement of vehicles and tourists had major influences on the concentrations of pollutants in museums.

Acknowledgements

I extend my heartfelt gratitude Louis Bruyns S.J Scholarship, University of Antwerp, Belgium for their financial support and generous cooperation for the fulfillment of this research and AXES research group especially Prof. Dr. Karolien De Wael and Prof. Dr. Piet Van Espen constructive guidance and advice my work at University of Antwerp.

References Références Referencias

1. Brimblecombe, P., Raychaudhuri, M. and Bowden, D. (2001). Surface reactions of deposited NO_2 in the museums environment. Abstract of the 4th meeting of the Indoor Air Pollution Working Group, National Museums of Denmark, Compenhagen, Nov.8th-9th.
2. Brimblecombe, P. (1990). The composition of museum atmospheres. Atmos. Environ., 24, 1–8.
3. Camuffo, D. (1998). Microclimate for Cultural Heritage, Elsevier, Amsterdam, 235–292.
4. Geerinckx, S. (2003). Measurement of $PM_{2.5}$ in Flanders: the ionic composition of particulatedust, Healthcare and Chemicals, Katholieke Hogeschool Kempen, Geel, 2003.
5. Giles, G. H. (1965). Fading of colouring matters, J. Appl. Chem., 15, 541–550.
6. Grontoft, T. and Raychaudhuri, M. R. (2004). Compilation of tables of surface deposition velocities for O_3, NO_2 and SO_2 to the range of indoor surfaces, Atmos Environ., 38, 533-544.
7. Hudson, F. L., Milner, W. D. (1961). Atmospheric sulphur and the durability of paper, J. Soc. Arch., 2, 166–167.
8. Kgabi, N. A. and Sehloho, R. M. (2012). Seasonal Variations of Ground Level Ozone Concentrations, Global Journal of Science Frontier Research (B), 12 Issue 5, Version 1.0, 21- 29.
9. Kgabi, N. A. and Sehloho, R. M. (2012). Tropospheric Ozone Concentrations and Meteorological Parameters, Global Journal of Science Frontier Research (B), 12, Issue 6, Version 1.0, 11 - 21.
10. Kontozova-Deutsch, V., Cardell, C., Urosevic, M., Ruiz-Agudo, E., Deutsch, F. and Van Grieken, R. (2011). Characterization of indoor and outdoor atmospheric pollutants impacting architectural monuments: the case of San Jero´nimo Monastery (Granada, Spain). Environ Earth Sci., 63, 1433–1445 DOI 10.1007/s12665-010-0657-5.
11. Kontozova, V., Spolnik, Z., Worobiec, A., Godoi, R., Van Grieken, R., Deutsch, F. and Bencs, L. (2005). Assessment of air pollutant levels in some European museums and churches, in: R. Van Grieken, K. Janssens (Eds.). (2005). Cultural Heritage Conservation and Environmental Impact Assessment by Non-Destructive Testing and Micro-Analysis, A. A. Balkema Publishers, Leiden, pp. 245–263.
12. Langwell, W. H. (1976). Measurement of the effect of air pollution on paper documents, J. Soc. Arch., 5, 372–373.
13. Morris, M. A., Young, M. A. and Molvig, T. A. W. (1964). The effects of air pollution on cotton, Text. Res. J., 34, 563–564.
14. Newton, R. G. (1945). Mechanism of exposure cracking of rubber with a review of the influence of ozone, J. Rubber Res., 14, 27–39.
15. Pavlogeorgatos, G. (2003). Environmental parameters in museums, Build. Environ., 38 (12), 1457–1462.
16. Pope, D., Gibbens, H. R. and Moss, R. L. (1986). The tarnishing of silver at naturally occurring H_2S and SO_2 levels, Corros. Sci., 8, 883–887.
17. Radiello's Manual, (2006). v. 01, Salvatore Maugeri Foundation IRCCS, Environmental Research Center, via Switzerland, 16, 35127 Padova, Italy. F1–F2 , (G1-G2).
18. Ricardo, H. M., Godoi, H. B., Carneiro, S. L., Paralovo, V. P., Campos, H. E., Van Grieken, R., Ana, F.L., Godoi, Tania, M. T. (2013). Indoor air quality of a museum in a subtropical climate: The Oscar Niemeyer museumin Curitiba, Brazil. Science of the Total Environment, 452–453: 314–320.
19. Salmon, L. G., Cass, G. R., Bruckman, K., Haber, J. (2000). Ozone exposure inside museums in the historic central district of Krakow, Poland, Atmos. Environ., 34 (22), 3823–3832.
20. Shahani, C. J. and Wilson, W. K. (1987). The preservation of libraries and archives, Am. Sci., 75, 240–251.
21. Spedding, D. J. and Rowlands, R. P. (1971). Sorption of sulphur dioxide by indoor surface (leather), J. Appl. Chem. Biotech., 21, 68–70.
22. Swan, A. (1981). Conservation of photographic print collections, Library Trends, 30, 267–296.
23. Thomson, G. (1986). The museum environment. 2nd ed. London: Butterworths.
24. Whitmore, P. M. & Cass, G. R. (1998). The ozone fading of traditional Japanese colorants, Studies in Conservation, 33, 29–40.
25. Whitmore, P. M. (1987). Concentration Dependence of Ozone Fading of Alizarin Crimson/Paper: Memorandum to the Environmental Quality Laboratory, California Institute of Technology, Pasadena, CA.
26. Worobiec, A., Samek, L., Karaszkiewicz, P., Kontozova- Deutsch, V., Stefaniak, E. A., Van Meel, K., Krata, A., Bencs, L. and Van Grieken, R. (2008). A seasonal study of atmospheric conditions influenced by the intensive tourist flow in the Royal Museum of Wawel Castle in Cracow, Poland, Microchem. J., 90 (2) 99–106.
27. Zeronian, S. H., Alger, K. W. and Omaye, S. T. (1973). Effects of sulphur dioxide on the chemical and physical properties of Nylon 66, Text. Res. J., 43, 228–237.
28. Zeronian, S. H. (1970). Reaction of cellulose fabrics to air contaminated with sulphur dioxide, Text. Res. J., 40, 695–698.

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Global Journal of Science Frontier Research: a
Physics and Space Science
Volume 18 Issue 7 Version 1.0 Year 2018
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4626 & Print ISSN: 0975-5896

Ferroelectric Transformer

By F. F. Mende

Abstract- In the article is described the ferroelectric transformer, which in contrast to the transformer with the ferromagnetic of cores can work at the high frequencies. Such previously transformers were not known. This opens prospects the creation of wide-band ferroelectric amplifiers.

Keywords: *transformer, ferroelectric, ferroelectric transformer, amplifier.*

GJSFR-A Classification: *FOR Code: 040401*

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I. Introduction

In connection with the fact that the law of magneto electric and electromagnetic induction, recorded in the total derivatives [1], they are symmetrical:

$$\oint \vec{E}' d\ \vec{l}' = -\int \frac{\partial \vec{B}}{\partial t} d\ S - \oint [\vec{B} \times \vec{V}] d\ \vec{l}'$$

$$\oint \vec{H}' d\ \vec{l}' = \int \frac{\partial \vec{D}}{\partial t} d\ S + \oint [\vec{D} \times \vec{V}] d\ \vec{l}' \quad ,$$

therefore must exist and the symmetrical technical solutions. Such solutions are located. For example, with the aid of the revolving magnetic field it is possible to create electric motors. For the same purposes it is possible to use the revolving electric field, and the engines, which use this principle, exist. There exists the transformers c ferromagnetic [serdechnikkom], in which with the aid of the magnetic flux they transfer energy of one winding into another. The symmetry of the laws indicated tells us, that must exist the transformer, whose core will be executed not of the ferromagnetic material, but of the ferroelectric. In the technology the transformers with the ferromagnetic cores widely are used. Their incapacity to work at the high frequencies is a large drawback in such transformers.

Is connected this with the large inertness of the processes of the reversal of polarity of transformer core. And in this connection question arises, and is it possible to create the transformer, in which as the core is used not the ferromagnetic material, but ferroelectric. Since the processes of electrical polarization have very small inertia, this transformer could work at the very high frequencies.

II. Possible the Schematics of Transformer

Let us examine the possible the schematics of ferroelectric transformer [2, 3].

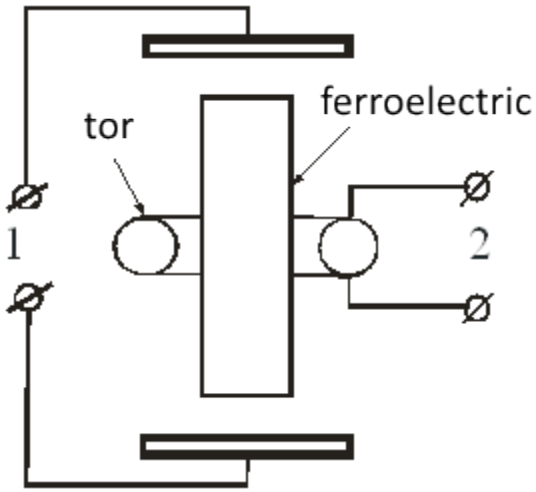

Fig. 1: Schematic of ferroelectric transformer

In to the composition of transformer enters the parallel-plate capacitor, between plates of which is placed the cylinder from the ferroelectric with the large dielectric constant. On the cylinder is placed the winding of torus, whose ends are connected to terminals 2. During the supplying to the capacitor of alternating voltage in the cylinder there will be leak polarization currents and the time-varying circulation of magnetic field will arise around the cylinder. This circulation will excite in the torus-shaped winding currents and a variable potential difference will appear on terminals 2.

Transformer with the toroidal ferroelectric core is depicted in Fig. 2.

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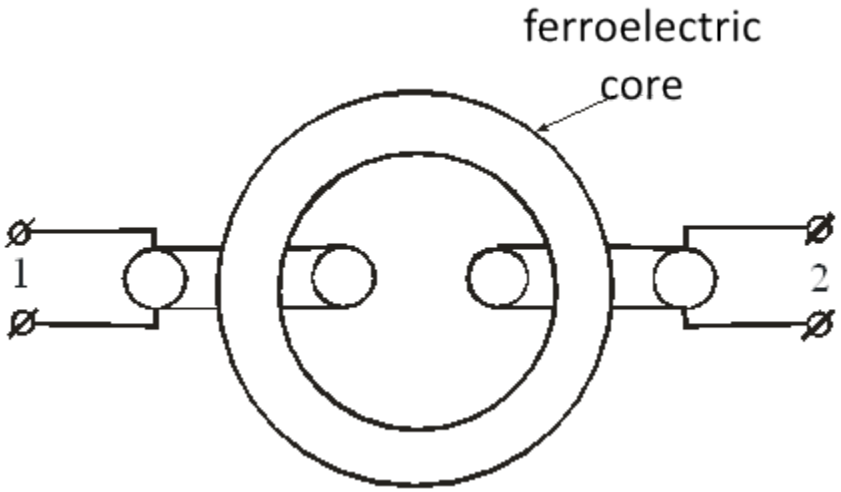

Fig. 2: Transformer with the toroidal ferroelectric core

It consists of the torus-shaped core, made from the ferroelectric, on which are placed two torus-shaped windings. The transformation ratio of this transformer depends on the relationship of the number of turns in the windings. The merit of transformer is the fact that it can work at the very high frequencies.

III. Conclusion

In spite of simplicity of idea and construction, unfortunately, the transformers of this type before the appearance of works [3] is nowhere described. But indeed they open very large prospects. It is known that the magnetic amplifiers, which possess high reliability, cannot find wide application only because they work at the low frequencies. In this case there are no such limitations in practice, since the processes of electrical polarization have very small inertia, and, using the transformer examined, it is possible to create the reliable wideband amplifiers, which work at the very high frequencies.

References Références Referencias

1. Mende F. F. On refinement of certain laws of classical electrodynamics, arXiv, physics/0402084.
2. Менде Ф. Ф. Непротиворечивая электродинамика. Харьков, НТМТ, 2008, – 153 с.
3. Менде Ф. Ф. Ферроэлектрический трансформатор. Инженерная физика, №4, 2012, с. 15-16.

Global Journal of Science Frontier Research: a
Physics and Space Science
Volume 18 Issue 7 Version 1.0 Year 2018
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4626 & Print ISSN: 0975-5896

Study of Thermal Distribution and Comfort in Shoe through CFD Technique

By Abu Jor, Md. Rafiul Hashar & Md. Samsul Arefin
Khulna University of Engineering & Technology

Abstract- Thermal comfort is an essential element for the human body and is increasingly becoming a crucial factor to be considered in footwear design. The previous study has shown that thermal conditions play a dominant role in-shoe climate. Development of thermal models that are capable of predicting in-shoe temperature distributions is an effective way to assist in design optimization. The aim of this study was to analyse the distribution of temperature, and the level of thermal comfort during wear of footwear through predicted mean vote (PMV) & percentage person's dissatisfaction (PPD) model using computational fluid dynamics (CFD) techniques. These will make easier to approximate the heat transferthermal-comfort relationships among the components. Four different temperatures ranges from very cold to very hot such as -20°C, 7°C,40°C,50°C were considered for this analysis,. The occupant (human foot) felt neutral to slightly cool in the cold weather and felt very hot in the hot weather within the footwear, and their PPD is more than 25%, 24%, 99.1%, and 99.1% respectively that means 74-75% persons will be satisfied in the cold and only of 0.99% persons will be satisfied in the hot country. Thus from this study, it can be concluded that the effectiveness of the footwear design for keeping the human foot thermally comfortable for different variety of weather can be assessed through this technique of CFD simulation.

Keywords: *CFD; footwear; temperature; comfort; simulation;*

GJSFR-A Classification: *FOR Code: 850599*

Strictly as per the compliance and regulations of:

Study of Thermal Distribution and Comfort in Shoe through CFD Technique

Abu Jor [α], Md. Rafiul Hashar [σ] & Md. Samsul Arefin [ρ]

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I. Introduction

Thermal comfort has a significant influence on the human body. Some factors affect human thermal comfort properties are clothing worn, climate condition, and physical activity (Layton, 2001). Several studies undertaken have shown that thermal conditions play a dominant role in-shoe climate. The climate inside a shoeis very much important to attain comfort and is controlled by thermal and moisture conditions (Covill et al., 2010). Nowadays, the footwear and textile manufacturers are focused not only on the quality and design of their products but also on customer comfort, which has also been one of the primary functions of most of the apparels (Sarier et al., 2012). The movement, adaptability of the material, waterproof qualities, and weight, thermal as well as moisture control would be the important parameters to be taken into consideration during the design and development of comfortable footwear (Kuklane, 2009). Regarding feet comfort up to 43% of customers dislike having cold feet, and 12% are concerned about sweat problems [Kuklane et al., 1999]. Therefore, thermal comfort is a key demand when considering comfortable footwear, and it can be achieved by keeping the footwear in the range of temperature from 27 °C to 33°C (Kuklane, 2009, Song, 2008). Applications of CFD for airflow predictions and temperature distribution in footwear may become an effective approach. Nielsen et al. (1974) were one of the first to investigate airflow and heat transfer in a room of a building using a CFD technique. Many research articles on CFD modeling in the building systems have become available (Chiang et al., 2012). Ravikumar et al., (2009) assessed the predicted mean vote (PMV) at the mid-plane of the room to locate the thermally comfortable zone using CFD method. The goal of this analysis was to investigate the thermal distribution across the footwear during wear using CFD technique, to analyse their thermal comfort level using PMV and PPD model for different weather condition and to develop an approach for comfort study.

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II. Finite Element Formulation

The commercial code Autodesk® Simulation CFD 2015 was used to simulate a three-dimensional steady state turbulent flow and heat transfer in the computational model. The partial differential equations governing fluid flow and heat transfer include the continuity equation, the Navier-Stokes equations and the energy equation [Sert, 2013]. A variety of physical phenomena like mass, energy, momentum, electric charge and other natural quantities may be described using continuity equations [Shukla et al., 2016]. The continuity equation is given below:

$$\partial u/\partial t + \partial u/\partial x + \partial u/\partial y + \partial u/\partial z = 0 \qquad (1)$$

Navier-Stokes equations are the basic governing equations for a viscous, heat conducting fluid. The Navier-Strokes equations are given below:

$$\rho\,(\partial v/\partial t + v \cdot \nabla v) = -\nabla p + \mu \nabla 2\, v + f \qquad (2)$$

For incompressible and subsonic compressible flow, the energy equation is shown regarding static temperature:

$$\rho Cp\,(\,\partial T/\partial t + u\,\partial T/\partial x + v\,\partial T/\partial y + w\,\partial T/\partial z = \partial/\partial x\,[k\,\partial T/\partial x] + \partial/\partial x\,[k\;\partial T/\partial x] + \partial/\partial x\,[k\;\partial T/\partial x\,] + q \qquad (3)$$

III. Material Specifications

The material specification required for a transient heat transfer footwear model include mass density, specific heat, thermal conductivity, emissivity, transmissivity, electrical resistivity and wall roughness; a list of the material properties used in the heat transfer footwear models and their sources can be seen in Table 1.

Table 1: Material properties used to assign the CAD model for simulation

Model part	Thermal conductivity (W/m-k)	Specific heat (J/Kg-K)	Mass density (Kg/m^3)	Emissivity	Transmissivity	Electrical resistivity (ohm-cm)	Wall rough-ness (mm)
Footwear upper (leather)	0.16 (Saha, 2014)	1500 (Kanay, 1955)	998 (Ishii et al., 2014)	0.77 (Spaldinget al.,1983)	0.02 (Spalding et al.,1983)	1e+16 (Weir, 1952)	0.000874 (Liu, 2008)
Insole (particle board)*	0.078	1300	590	0.8	0	3e+17	0
Occupant (human foot)*	50	4182	998	0.98	0	0	0
Air volume*	0.02563	1004	--	1	--	--	0

These properties are also only of importance in transient models, where the change in temperature with respect to time is not zero. The thermal property that defines the contact between materials determines the continuity of temperature distributions and the degree of heat flow between separate materials.

IV. Process Implementation

For this analysis considered four different thermal conditions such as very cold, cold and hot and very hot temperatures and also considered the upper material as leather. The process is done by generating a geometric thermal model and specifying material properties along with boundary conditions. Next, the model is divided into smaller elements connected at nodes through a process known as meshing and then solved the model (Fig. 1). Finally, plots and numerical results are output to provide engineers with insights to the behaviour of the model. All the boundary conditions have been assigned for the above selected temperatures -20°C (Samant, 2014), 7°C, 40°C(Khanna et al., 1998)and (50°C) (Samant, 2014).

Table 2: Detail specifications of the CAD model

Shoe	Dimension	Unit
Size	43	Paris point
length	28.66	cm
width	9.25	cm
Upper(leather) thickness	0.08	cm
Insole(particle board) thickness	0.20	cm

A 3D footwear model with simulated human foot inside it was modelled for this study using solid works software. Table 2 represents the detail specifications of the model. Leather as upper, taxon/particle board as a insole, human as foot and the air was assigned as the internal gap. By assigning boundary conditions such as heat flux, heat generation, film coefficient, velocity, pressure, and temperature to the openings and other specific locations of footwear, it was effectively "connected" the design with the physical world. Air velocity at the inlet surface of 0.15 m/s (ANSI/ASHRAE Standard 55, 2004) to flow air inside the footwear and the temperature at the inlet section was assigned respectively for selected weather conditions. The outlet surface was defined by atmospheric pressure which allowed the air to move within the model boundary. A boundary condition of film coefficient was also applied to the external surfaces to simulate heat transfer to the surroundings.

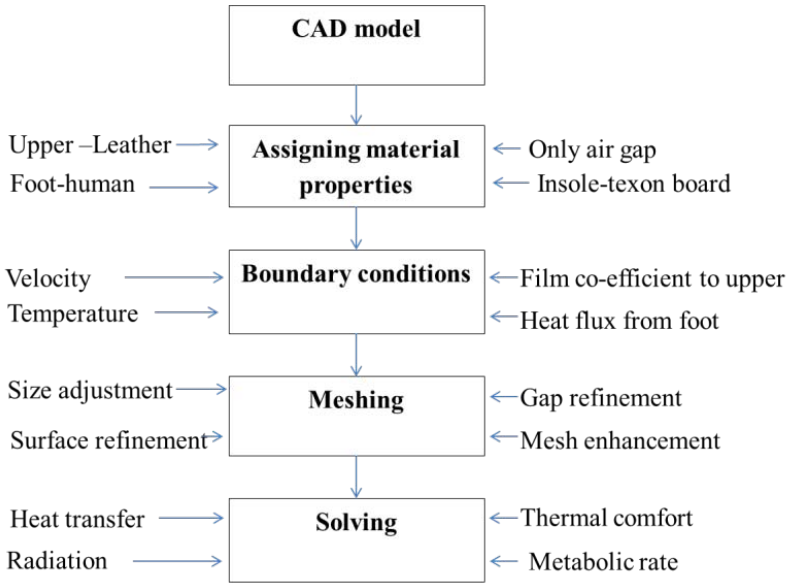


Figure 1: Implementation of the simulation model

Considering the surrounding air is static, a film coefficient value of 5 W/m^2 K was used (Autodesk, 2014). Reference temperature for film coefficient was equal to the ambient temperature of the respective areas which was of respectively around the assigned condition. Heat flux put into the system to represent the heat provided by blood flow. The boundary condition of heat flux was used on the surface of the human foot model to consider the value of heat flux in CFD simulation. The value of 150 W/m^2 (at1.3 m/s) was taken from the estimated whole body as the heat flux during walking (Cengel, 1998). Here the foot surface area covered about 7% of the total body surface area.

Before running an Autodesk Simulation CFD analysis, the geometry is broken up into small components called elements. The corner of each element is a node. The calculation is performed at the nodes. These elements and nodes make up the mesh. The solution accuracy of any simulation largely depends on grid generation. Automatic mesh scheme followed by advanced mesh enhancement was used to generate fine mesh (Fig. 2).

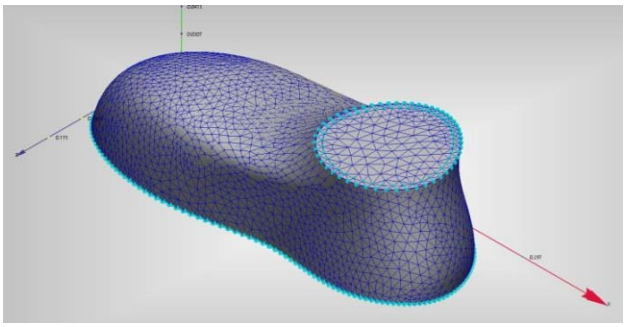


Figure 2: Meshing view of the CAD model

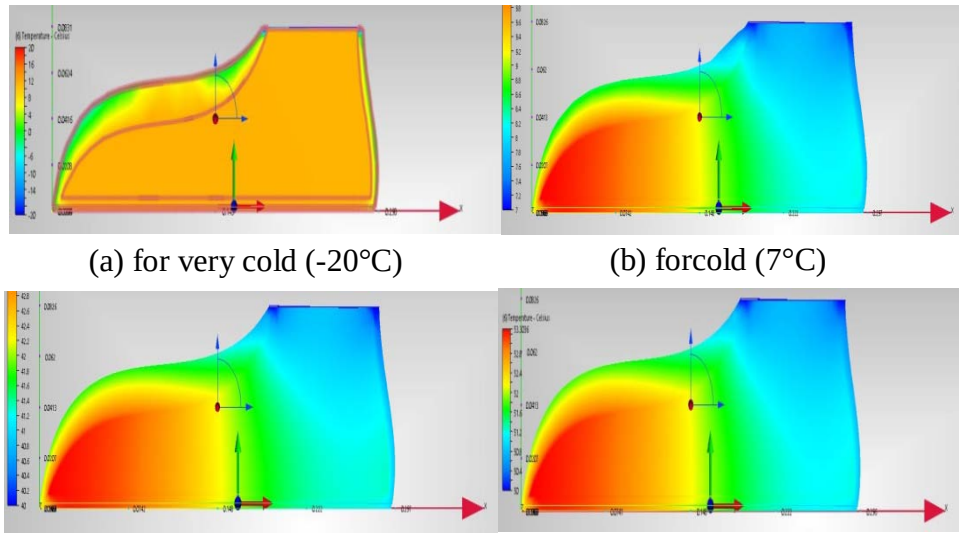
To define the simulation way, the physics tab to enable physical models such as flow and heat transfer, the control tab to specify analysis parameters such as steady state or transient and to set the number of iterations and the adaptation tab was used to progressively improve the mesh by running the simulation multiple times. At the end of each run, adaptation modifies the mesh based on the results and uses the new mesh for the next cycle. The result is a mesh that is optimized for the particular simulation. Table 3 represents the solver settings.

Table 3: Solver settings

Solution parameters	Settings/Values
Heat transfer	On
Radiation	On
Thermal comfort	On
Metabolic rate	150 W/m^2
Humidity	50%
Clothing(socks)	0.74 clo
Iterations run	100

V. Results And Discussion

The assigned air of -20°C, 7°C, 40°C and 50°C temperature entered into the footwear and came in contact with the heat generating source (i.e., human foot) and got heated (Fig. 3). In this way temperature was distributed inside the footwear and increased due to the insulating property of it and remained between 11.1°C to 12.3°C, 8.2°C to 10.3°C, 41.2 to 43.4°C and 51°C to 53.3°C respectively.



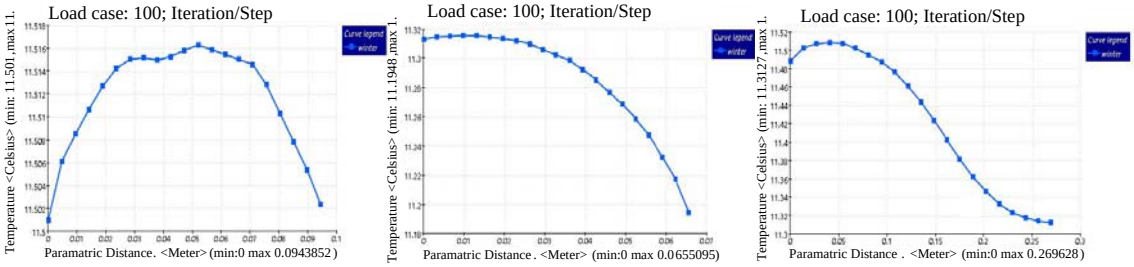
(a) for very cold (-20°C) (b) forcold (7°C)

(c) for hot (40°C) (d) for very hot (50°C)

Figure 3: The temperature distribution cut plane at different weather condition

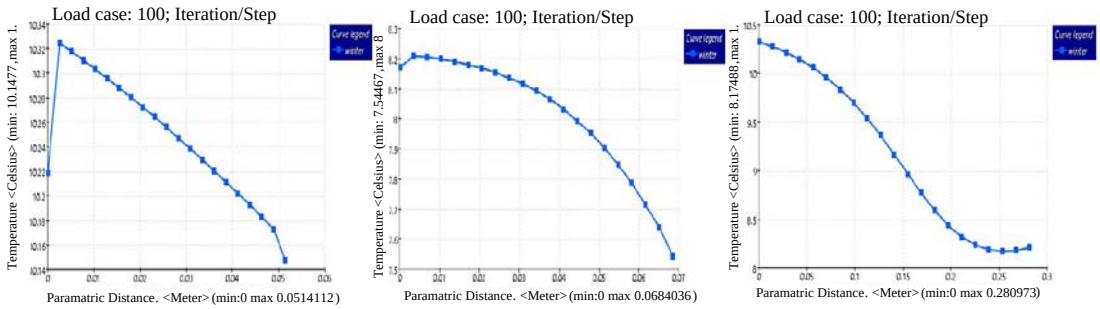
In figure 3(b) continuous air flow from the opening of the footwear but in figure 3(b) no air within it resulting from the close air tight opening of the footwear during wears in cold country.

The temperature profile at toe, heel and bottom portion on the XY plane in case of very much cold condition shown in Fig. 4. It showed the vertical thermal stratification in the footwear. At the toe, heel and bottom portion the temperature was in the range of 11. 50°C to 11.51°C, 11.20°C to 11.30°C and 11.32°C to 11.50°C respectively. The temperatures within the footwear were near the same in the entire toe, heel and bottom portion because of compact air-tight opening and unavailability of air circulation. In the same way, the temperature profile at the toe, heel and bottom portion on XY plane in case of cold condition (Fig. 5) was in the range of 10.15°C to 10.34°C, 7.6°C to 8.2°C and 8.2°C to 10.3°C – respectively. In case of hot weather condition (Fig. 6),it was in the range of 43.2°C to 43.4°C, 40.4°C to 41.3°C and 41.3°C to 43.4°C respectively, and in case of very much hot condition (Fig. 7) was in the range of 52.85°C to 53.3°C, 50.6°C to 51.2°C and 51.2°C to 53.3°C respectively.



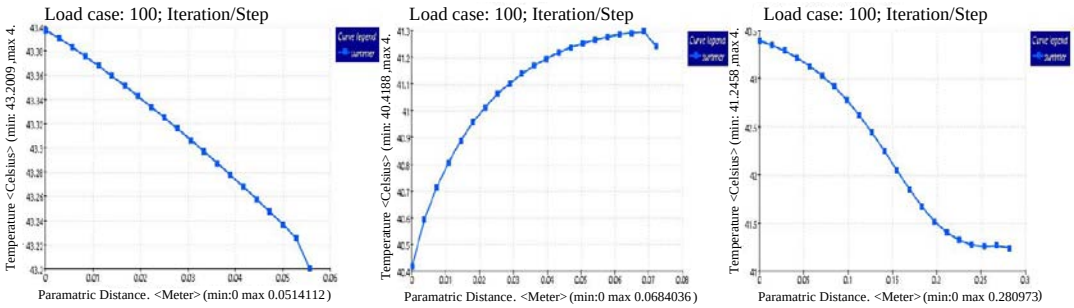
(a) At toe portion (b) At heel portion (c) At bottom portion

Figure 4: The temperature profile in case of very cold (-20°C)weather



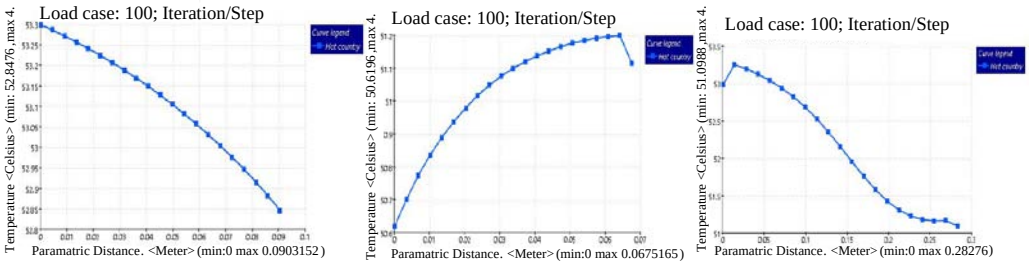
(a) At toe portion (b) At heel portion (c) At bottom portion

Figure 5: Thetemperature profile in case of cold (7°C) weather



(a) At toe portion (b) At heel portion (c) At bottom portion

Figure 6: Thetemperature profile in case of hot (40°C) weather

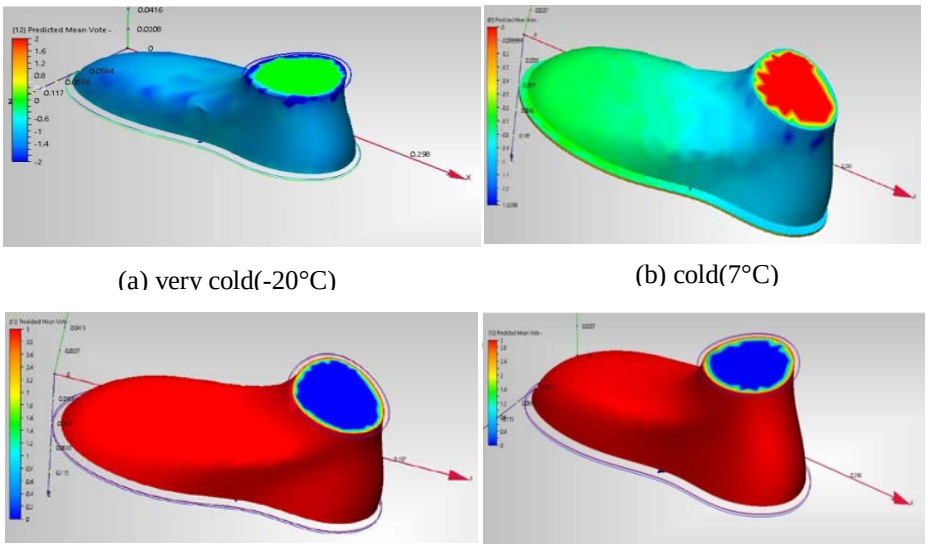


(a) At toe portion (b) At heel portion (c) At bottom portion

Figure 7: Thetemperature profile in case of very hot (50°C)weather

The intensity of temperature within the footwear was much more at the toe portion than in the heel portion results due to the variation of air circulation at the opening of the shoe.

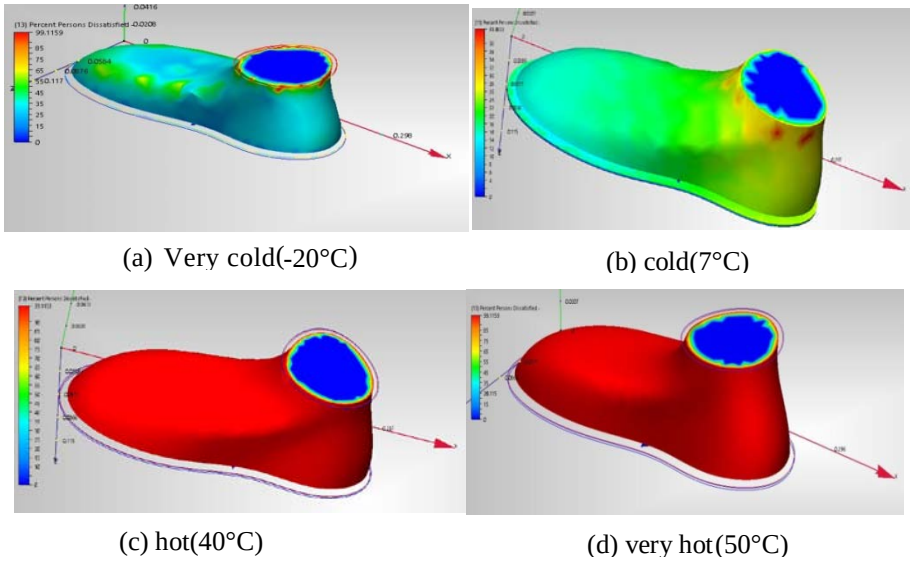
According to PMV in figure 8., the occupant (human foot) felt, neutral to slightly cool in the cold weather and felt slightly warmtovery hot in the hot weather within the shoe according to ASHRAE thermal sensation scale(ANSI/ASHRAE Standard 55, 2004)(Table 4) and their PPD is up to 25%, 24%,99.1% and 99.1% respectively shown in figure 9. The level of satisfaction comparatively increased in very cold condition (25%) due to the closed air-tight opening of the shoe.



(a) very cold(-20°C) (b) cold(7°C)

(c) hot(40°C) (d) very hot(50°C)

Figure 8: Comparison of PMV among four different weather conditions



(a) Very cold(-20°C) (b) cold(7°C)

(c) hot(40°C) (d) very hot(50°C)

Figure 9: Comparison of PPD among four different weather conditions

The result says that the footwear is near the comfort range only in cold regions with closed air-tight at the opening of the shoe.

Table 4: ASHRAE Thermal sensation scale

Value	Sensation
+3	Hot
+2	Warm
+1	Slightly warm
0	Neutral
-1	Slightly cool
-2	Cool
-3	Cold

VI. Conclusions

A simple 3D model has been developed successfully to simulate in-shoe temperatures in various locations using CFD simulation. These models covered different temperature as boundary conditions. Predicted temperature distributions in the foot and shoe indicate greater heat transfer in the toe region in case of hot weather, but in the cold weather temperatures were increased and distributed evenly. This model demonstrated an approach to simulating in-shoe microclimatic conditions, with promising results. The modeling results were then linked to the thermal comfort index to assist shoe manufacturers to design footwear with better thermal comfort properties. Occupant's (human foot) PMV and PPD values were not acceptable according to ASHRAE thermal sensation scale when used in hot weather condition due to felt hot in this region. Because of the very high temperature around the human foot experienced approximately 99.1% discomfort in this situation. On the other hand, PMV and PPD values were quite acceptable when the footwear was used in cold weather condition hence the human foot felt neutral to slightly cool in this situation according to ASHRAE thermal sensation scale. Here the human foot experienced only 25% discomfort which showed a good option according to the foot comfort range. Now it can be concluded that the designed footwear model is comparatively best for use in cold weather. This work will establish a base to develop more complex 3D thermal models, further to the coupled models, to cover both temperature and moisture. The techniques developed are also useful for modeling other microclimate conditions, such as in-glove, helmet, and in-clothing environments.

Acknowledgement

We thank Caders KUET for their support in model development

References Références Referencias

1. ANSI/ASHRAE Standard 55-2004, "Thermal Environmental Conditions for Human Occupancy", First Public Review, Sep 2008.
2. ASHRAE/ANSI Standard 55, (2004). Thermal Environmental Conditions for Human Occupancy, American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 1791 Tullie Circle NE, Atlanta, GA 30329.
3. Autodesk, Inc. (2014). Boundary Conditions in Simulation CFD, Intro to Simulation CFD for AEC Applications, Published on Autodesk University Workshop, Design Academy.
4. Cengel, Y. A. (1998). Heat transfer: a practical approach, (McGraw-Hill, New York).
5. Chiang W.H., Wang C.Y., & Huang J.S. (2012). Evaluation of cooling ceiling and mechanical

ventilation systems on thermal comfort using CFD study in an office for subtropical region, Building and Environment, 48, 113-127.

6. Covill, D., Guan, Z.W., Bailey, M., & Raval, H. (2010). "Development of thermal models of footwear using finite element analysis", Proc. IMechE Part H: J. Engineering in Medicine, Vol. 225.
7. Ishii, H., Sakurai, Y., & Maruyama, T. (2014). Effect of soccer shoe upper on ball behavior in curve kicks, Scientific reports.
8. Kanagy, R. J. (1955). Specific Heats of Collagen and Leather, October, Vol. 55, No. 4.
9. Khanna, S.K., & Shudarshan, K.N. (1998). "Encyclopedia of South Asia Bangladesh", APH Publishing Corporation, ISBN8170249198, pages 322
10. Kuklane, K. (2009). Protection of feet in cold exposure, Ind Health; 47: 242–253.
11. Kuklane, K., Holmer, Y., & Giesbrecht, G. (1999). Change foot-wear insulation at various sweating rates, J Physiol Anthropol Appl Hum Sci, 18: 161–168.
12. Layton J.M. (2001). The science of clothing comfort, The textile institute, Textile progress, 31 (1/2). UK.
13. Liu, X., Yue, Z., Cai, Z. D., Chetwynd, G., & Smith, S. T. (2008). Quantifying touch–feel perception: tribological aspects, Meas. Sci. Technol., February.
14. Ravikumar, P., & Prakash, D. (2009). "Analysis of thermal comfort in an office room by varying the dimensions of the windows on adjacent walls using CFD: A case study based on numerical simulation", Building Simulation, 2: 187–196.
15. Saha, G. K. (2014). Study of the Thermal Conductivity of Leather Having Various Compactness and Geographical Origin, Department of Mechanical Engineering, Bangladesh University of Engineering and Technology Samant, S. (2014). TRAVEL Top 10 Coldest Countries in the World.
16. Samant, S. (2014). TRAVEL Top 10 Hottest Countries in the World.
17. Sarier, N., & Onder, E. (2012). Organic phase change materials and their textile applications: an overview, Thermochim Acta; 540: 7–60.
18. Sert, D. C. (2013). Governing Equations of Fluid Flow and Heat Transfer, ME 582 Finite Element Analysis in Thermofluids.
19. Shukla, T., & Ghariya, R. (2016). Simulation & Modeling Of CMOS Image sensor, Intelligent Systems and Control (ISCO), 10th International Conference on, Coimbatore, India, 10.1109/ ISCO.7726907
20. Song, G. S. (2008). Effect of floor surface temperature on blood flow and skin temperature in the foot, Indoor Air, 18: 511–520.
21. Spalding, D. B., & Taborek, J. (1983). Emissivity of solids, Heat Exchanger Design Handbook, Multimedia Edition, Hemisphere Publishing Corporation ISBN: 978-1-56700-423-6
22. Weir, E.C. (1952). Influence of Temperature and Moisture on the Electrical Properties of Leather, Journal of Research of the National Bureau of Standards, Vol. 48, No. 5.

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We shall provide print version of 12 issues of any three journals [as per your requirement] out of our 38 journals worth $ 2376 USD.

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The individual Fellow and Associate designations accredited by Open Association of Research Society (US) credentials signify guarantees following achievements:

- The professional accredited with Fellow honor, is entitled to various benefits viz. name, fame, honor, regular flow of income, secured bright future, social status etc.

- In addition to above, if one is single author, then entitled to 40% discount on publishing research paper and can get 10%discount if one is co-author or main author among group of authors.
- The Fellow can organize symposium/seminar/conference on behalf of Global Journals Incorporation (USA) and he/she can also attend the same organized by other institutes on behalf of Global Journals.
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- • This individual has learned the basic methods of applying those concepts and techniques to common challenging situations. This individual has further demonstrated an in–depth understanding of the application of suitable techniques to a particular area of research practice.

Note :

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- In future, if the board feels the necessity to change any board member, the same can be done with the consent of the chairperson along with anyone board member without our approval.
- In case, the chairperson needs to be replaced then consent of 2/3rd board members are required and they are also required to jointly pass the resolution copy of which should be sent to us. In such case, it will be compulsory to obtain our approval before replacement.
- In case of "Difference of Opinion [if any]" among the Board members, our decision will be final and binding to everyone.

"

Preferred Author Guidelines

We accept the manuscript submissions in any standard (generic) format.

We typeset manuscripts using advanced typesetting tools like Adobe In Design, CorelDraw, TeXnicCenter, and TeXStudio. We usually recommend authors submit their research using any standard format they are comfortable with, and let Global Journals do the rest.

Alternatively, you can download our basic template from https://globaljournals.org/Template.zip

Authors should submit their complete paper/article, including text illustrations, graphics, conclusions, artwork, and tables. Authors who are not able to submit manuscript using the form above can email the manuscript department at submit@globaljournals.org or get in touch with chiefeditor@globaljournals.org if they wish to send the abstract before submission.

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Authors must ensure the information provided during the submission of a paper is authentic. Please go through the following checklist before submitting:

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3. Ensure corresponding author's email address and postal address are accurate and reachable.
4. Manuscript to be submitted must include keywords, an abstract, a paper title, co-author(s') names and details (email address, name, phone number, and institution), figures and illustrations in vector format including appropriate captions, tables, including titles and footnotes, a conclusion, results, acknowledgments and references.
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Declaration of Conflicts of Interest

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- Findings
- Writings
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- Graphs
- Illustrations
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- Printed material
- Graphic representations
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3. Final approval of the version of the paper to be published.

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The corresponding author should mention the name and complete details of all co-authors during submission and in manuscript. We support addition, rearrangement, manipulation, and deletions in authors list till the early view publication of the journal. We expect that corresponding author will notify all co-authors of submission. We follow COPE guidelines for changes in authorship.

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Unless specified in the notification, the Editorial Board's decision on publication of the paper is final and cannot be appealed before making the major change in the manuscript.

Acknowledgments

Contributors to the research other than authors credited should be mentioned in Acknowledgments. The source of funding for the research can be included. Suppliers of resources may be mentioned along with their addresses.

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Preparing your Manuscript

Authors can submit papers and articles in an acceptable file format: MS Word (doc, docx), LaTeX (.tex, .zip or .rar including all of your files), Adobe PDF (.pdf), rich text format (.rtf), simple text document (.txt), Open Document Text (.odt), and Apple Pages (.pages). Our professional layout editors will format the entire paper according to our official guidelines. This is one of the highlights of publishing with Global Journals—authors should not be concerned about the formatting of their paper. Global Journals accepts articles and manuscripts in every major language, be it Spanish, Chinese, Japanese, Portuguese, Russian, French, German, Dutch, Italian, Greek, or any other national language, but the title, subtitle, and abstract should be in English. This will facilitate indexing and the pre-peer review process.

The following is the official style and template developed for publication of a research paper. Authors are not required to follow this style during the submission of the paper. It is just for reference purposes.

Manuscript Style Instruction (Optional)

- Microsoft Word Document Setting Instructions.
- Font type of all text should be Swis721 Lt BT.
- Page size: 8.27" x 11'", left margin: 0.65, right margin: 0.65, bottom margin: 0.75.
- Paper title should be in one column of font size 24.
- Author name in font size of 11 in one column.
- Abstract: font size 9 with the word "Abstract" in bold italics.
- Main text: font size 10 with two justified columns.
- Two columns with equal column width of 3.38 and spacing of 0.2.
- First character must be three lines drop-capped.
- The paragraph before spacing of 1 pt and after of 0 pt.
- Line spacing of 1 pt.
- Large images must be in one column.
- The names of first main headings (Heading 1) must be in Roman font, capital letters, and font size of 10.
- The names of second main headings (Heading 2) must not include numbers and must be in italics with a font size of 10.

Structure and Format of Manuscript

The recommended size of an original research paper is under 15,000 words and review papers under 7,000 words. Research articles should be less than 10,000 words. Research papers are usually longer than review papers. Review papers are reports of significant research (typically less than 7,000 words, including tables, figures, and references)

A research paper must include:

a) A title which should be relevant to the theme of the paper.
b) A summary, known as an abstract (less than 150 words), containing the major results and conclusions.
c) Up to 10 keywords that precisely identify the paper's subject, purpose, and focus.
d) An introduction, giving fundamental background objectives.
e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition, sources of information must be given, and numerical methods must be specified by reference.
f) Results which should be presented concisely by well-designed tables and figures.
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.

i) Discussion should cover implications and consequences and not just recapitulate the results; conclusions should also be summarized.
j) There should be brief acknowledgments.
k) There ought to be references in the conventional format. Global Journals recommends APA format.

Authors should carefully consider the preparation of papers to ensure that they communicate effectively. Papers are much more likely to be accepted if they are carefully designed and laid out, contain few or no errors, are summarizing, and follow instructions. They will also be published with much fewer delays than those that require much technical and editorial correction.

The Editorial Board reserves the right to make literary corrections and suggestions to improve brevity.

Format Structure

It is necessary that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

All manuscripts submitted to Global Journals should include:

Title

The title page must carry an informative title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) where the work was carried out.

Author details

The full postal address of any related author(s) must be specified.

Abstract

The abstract is the foundation of the research paper. It should be clear and concise and must contain the objective of the paper and inferences drawn. It is advised to not include big mathematical equations or complicated jargon.

Many researchers searching for information online will use search engines such as Google, Yahoo or others. By optimizing your paper for search engines, you will amplify the chance of someone finding it. In turn, this will make it more likely to be viewed and cited in further works. Global Journals has compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Keywords

A major lynchpin of research work for the writing of research papers is the keyword search, which one will employ to find both library and internet resources. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining, and indexing.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy: planning of a list of possible keywords and phrases to try.

Choice of the main keywords is the first tool of writing a research paper. Research paper writing is an art. Keyword search should be as strategic as possible.

One should start brainstorming lists of potential keywords before even beginning searching. Think about the most important concepts related to research work. Ask, “What words would a source have to include to be truly valuable in a research paper?” Then consider synonyms for the important words.

It may take the discovery of only one important paper to steer in the right keyword direction because, in most databases, the keywords under which a research paper is abstracted are listed with the paper.

Numerical Methods

Numerical methods used should be transparent and, where appropriate, supported by references.

Abbreviations

Authors must list all the abbreviations used in the paper at the end of the paper or in a separate table before using them.

Formulas and equations

Authors are advised to submit any mathematical equation using either MathJax, KaTeX, or LaTeX, or in a very high-quality image.

Tables, Figures, and Figure Legends

Tables: Tables should be cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g., Table 4, a self-explanatory caption, and be on a separate sheet. Authors must submit tables in an editable format and not as images. References to these tables (if any) must be mentioned accurately.

Figures

Figures are supposed to be submitted as separate files. Always include a citation in the text for each figure using Arabic numbers, e.g., Fig. 4. Artwork must be submitted online in vector electronic form or by emailing it.

Preparation of Eletronic Figures for Publication

Although low-quality images are sufficient for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit (possibly by e-mail) EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Avoid using pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings). Please give the data for figures in black and white or submit a Color Work Agreement form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution at final image size ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs): >350 dpi; figures containing both halftone and line images: >650 dpi.

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Tips for Writing a Good Quality Science Frontier Research Paper

Techniques for writing a good quality Science Frontier Research paper:

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:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- 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.

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	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