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International Journal of Current Research
Vol. 9, Issue, 08, pp.55465-55468, August, 2017

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

# NEW COULOMB'S FORCE FORMULATION WITH BALANCE BLACK BODY TEMPERATURES CORRELATED TO CHARGES – THE LAST ONES ARE NO MORE EMPLOYED

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ARTICLE INFO

*Article History:*
Received 22nd May, 2017
Received in revised form
24th June, 2017
Accepted 08th July, 2017
Published online 31st August, 2017

*Key words:*
New Coulombs' law,
Photonic quantic electrostatic potential,
Quantic electrostatic EVTD$^2$,
Quantic substratum,
EVTD$^2$ entities theory,
Correlations between bodies charges
and Their black bodies' temperatures.

ABSTRACT

This paper follows the recent publication (Conte and Roşca, 2017) relative to the correlations between Newton's law and the consequences of surfaces black bodies' emittances and, also it follows (Conte and Rosca, 2017) that already had highlighted the correlation between the masses and their surfaces equivalent black body temperatures to the fourth power ($T_e^4$). Here, taking into account the black body emittances products and those of considered charges, it was possible, to show that this electrostatic force can be defined only by the product of corresponding charged bodies' temperatures ($T_e^4$) to the fourth power on their distance square and, multiplied by a conform constant. Validation calculi, using simple data, show the accuracy of the new approach of the Coulomb force where the charges are no longer directly used. This shows, for the second time, the importance of black bodies $T_e$ and electrical charges distribution on a conductor.



**Citation: Conte, M.J. and Roşca, I.C. 2017.** "New Coulomb's force formulation with balance black body temperatures correlated to charges – the last ones are no more employed", *International Journal of Current Research*, 9, (08), 55465-55468.

## INTRODUCTION

Due to the strong resemblance between the two relationships of Newton and Coulomb and more, by our new writing (Conte, 2017), with temperatures equivalent black body to the fourth power, and the relation giving the force of gravity, we try here the same approach on the Coulomb relationship. The latter is recalled in (1):

$$F_{A/B} = k\frac{q.Q}{d^2} = 8.9875517273\,68 \cdot 10^9 \frac{q.Q}{d^2} \; . \qquad (1)$$

Electric charges come in the immediate vicinity of the loaded conductor surface. It is recognized, these charges are not to be still and they repel each other as being of the same polarity. They are therefore in constant movement: so that, for the EVTD$^2$ entities theory, the shock-impulses of the electric charges on the space-time entities generate electromagnetic effects of characteristics multi-wavelength. These electromagnetic radiation (additional electrical loads) are added to the black body own radiation of the condensed matter in the conductor at a certain temperature. It is however important to note that radiation due to additional loads having their origins in near surface will be high-performing, virtually no absorption of the material to be emitted into the vacuum of space occurring. So the surface equivalent black body temperature for a charged conductor will be the sum of these two distinct effects; but non stackable as being of the same electromagnetic nature. It seems, because of this, that the resulting $T_e$ (equivalent blackbody temperatures added to those of surfaces additional charges) will have significantly higher values compared to those of simply electrically neutral condensed matter. It is therefore that in the new EVTD2 physics all space, the vacuum as the inside of subatomic matter (at least the 95% from (Durr, 2008), current physics, would be a pretty good support for those transmissions of electromagnetic radiation. Extrapolating, we can say that just as the gravitational field, has been envisaged as being of photonic nature and thus, quantic (Conte, 2017; Roşca, 2017; Conte, 2015 and Conte, 2015), and, there are also the possibility that the electrostatic field is likewise, photonic and quantic. This helps to understand a little better, the similarity between the Newton's and Coulomb's relationships. It is therefore probable that this new formulation of Coulomb's relationship studied here, is possible by analogy, with the new formulation of Newton's relationship studied and demonstrated in (Conte, 2017). In addition, for completeness,

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we have shown and considered in (Conte and Roşca, 2005) a revisit of the electromagnetic interaction by EVTD2 entities theory in which it is especially necessary that there be a mini black hole in zero resulting potential. Also in (Conte, 2015), there was a demonstration of equivalence between electric charge, energy and mass based on the quantic nature of the load.

## ORIGINAL RELATIONSHIP OF CHARGED BODIES EMMITTANCES, SIMILARLY TO THE ELECTRO-STATIC COULOMB'S FORCE

By extending the work (Conte, 2017; Conte, 2017 and Conte, 2015), and after introduction reminders, the idea of establishing, if possible, a similarity between the Coulomb relationship and a relationship with a product not of the loads but of their surfaces emittance (Stefan Boltzmann) respective in $T_e$, seems attractive. This relationship of electrostatic forces, named $F_{Te_{A/B}}$ is the product of black bodies' emittances and of additional charges of charged objects, A and B, divided by the square of their distance ($d^2$) between the gravity centers, multiplied by a constant $X$, unknown for moment. This relationship (similar to Coulomb) is written with transformations on the model that can be described in (2):

$$F_{Te_{A/B}} = \frac{\sigma T_{eA}^4 \cdot \sigma T_{eB}^4}{d^2} X = P^P_{Te/m^6} \cdot X = P_{Te/m^2} \cdot \sigma^2 \cdot X \cdot \quad (2)$$

Thus we have $\frac{\sigma T_{eA}^4 \cdot \sigma T_{eB}^4}{d^2} = P^P_{Te/m^6}$, which is somehow the photonic power radiated on $m^6$, expressed by the surfaces emittances product divided by the square of the reciprocal distance $d$. If we include the Stefan Boltzmann constant square product ($\sigma^2$) in the constant $X$ another constant, $D_{Te}$, is obtained:

$$P_{Te/m^2} = \frac{T_{eA}^4 \cdot T_{eB}^4}{d^2} \text{ and } \sigma^2 \cdot X = D_{Te}\,, \quad (3)$$

hence (2) is written as:

$$F_{Te_{A/B}} = D_{Te} \frac{T_{eA}^4 \cdot T_{eB}^4}{d^2}\,. \quad (4)$$

More, in corresponding measure units, square Stefan Boltzmann constant is expressed as: $\lfloor \sigma^2 \rfloor \approx W^2 \cdot m^{-4} \cdot K^{-8}$ wherefrom results: $\lfloor P^P_{Te/m^6} \rfloor \approx W^2 \cdot m^{-6}$ and by extension:

$$\lfloor P^P_{Te/m^6} \rfloor \approx N^2 \cdot m^2 \cdot m^{-6} \cdot s^{-2} \approx N^2 \cdot m^{-4} \cdot s^{-2}\,. \quad (5)$$

Now it is assumed that a unit $N$ in the relation (5) can match and represent the Coulomb force $F_{A/B}$, between the bodies A and B, which uses the considered load values, their reciprocal distance and Coulomb's constant. We will therefore establish the consistent relationship to this and finally, digital applications will be done to see if this situation is ultimately appropriate or not. *It then comes from (5), in yet hypothetical correspondence:*

$$\lfloor P^P_{Te/m^6} \rfloor \approx [F_{A/B}] \cdot N \cdot m^{-4} \cdot s^{-2}\,. \quad (6)$$

But unlike the work (Conte and Roşca, 2017) we do not have all the data to make at this stage, a digital verification. It is firstly necessary to determine the constant $DT_e$ and further the equivalent (charged black body) temperatures $T_{eA}$ and $T_{eB}$ for the considered charged conductors.

## DETERMINATION OF THE CONSTANT $D_{TE}$, THE EQUIVALENT BLACK BODIES TEMPERATURES AND THE CONDUCTOR CHARGES

In order to rapidly and simply obtain the above mentioned parameters through the Coulomb's law ($F_{A/B}$), entire values charges (measured in coulombs) and distances of 1 m will be took into account. Thus, different values respective to next cases will be:

$F_{1+/1-}=k=8.987551727368 \cdot 10^9$, $F_{2+/2-}=4k$, $F_{2+/3-} = 6\,k$, $F_{2+/4-} = 8\,k$, $F_{2+/5-} = 10\,k$, $F_{2+/6-} = 12\,k$.

Now we can write the expression of the relationship $F_{TeA/B}$ for two charges +2 and -2 and by making the assumption that it is equal to the corresponding value of the direct relationship of Coulomb. More, with the hypothesis that $T_{e2-}$ and $T_{e2+}$ have identical values in the same environment (Terrestrial ground), where:

(2)

$$F_{Te_{2-/2+}} = D_{Te} \frac{T_{e2-}^8}{1^2} = F_{2-/2+} = 4k\,. \quad (7)$$

From (7) results:

$$T_{e2-}^4 = \sqrt{\frac{4k}{D_{Te}}}\,. \quad (8)$$

Let us consider two very small loads of $10^{-3}$ C, one positive the other negative separated by *1 m* on Earth whose soil $T_e$ is estimated at 254°K. Due to the very low intake of these charges it is assumed that the rise of the resulting $T_e$ by this effect is restricted and eventually $T_e$ charged surfaces would be increased to about $T_{e0.001+}$ = 256°K. Coulomb's force and the force $F_{Te_{0.001-/0.001+}}$ will give, in this case:

(4)

$$F_{AB_{0.001-/0.001+}} = k\frac{10^{-6}}{1^2} = 8.9875517273\,68 \cdot 10^3 = $$
$$= F_{Te_{0.001-/0.001+}} = D_{Te}\frac{T_{e0.001+}^8}{1^2} = k \cdot 10^{-6}.$$

Hence, the value for the $D_{Te}$ constant is:

(5)

$$D_{Te} = \frac{8987.551727368}{256^8} = 4.8721615866 \cdot 10^{-16}\ N \cdot m^2 \cdot K^{-8}\,. \quad (9)$$

After determining - estimating $D_{Te}$, will follow calculi for determining $T_e$ of electrically charged bodies' surfaces. Coulomb forces for various charges always one meter spaced will be essential marks for these calculations. Thus we can write:

$$F_{A/B_{1-/1+}} = 8.9875517273\ 68 \cdot 10^9 \frac{1 \cdot 1}{1^2} = $$
$$= F_{Te_{1-/1+}} = 4.8721615866 \cdot 10^{-16} \cdot T_{e1-}^8 \quad (6)$$

and, hence: $T_{e1-} = 1439.6^o K \approx 1440^o K$ .

For determining $T_e$ in the other cases:

$$F_{A/B\,2-/2+} = 8.9875517273\,68 \cdot 10^9 \frac{4}{1^2} = = F_{Te\ 2-/2+} = 4.8721615866 \cdot 10^{-16} \cdot T^8_{e\,2-}$$

and this gives: $T_{e2-} = 1711.97^o K \approx 1712^o K$ .

$$F_{A/B\,3-/3+} = 8.9875517273\,68 \cdot 10^9 \frac{9}{1^2} = = F_{Te\ 3-/3+} = 4.8721615866 \cdot 10^{-16} \cdot T^8_{e\,3-} \Rightarrow$$

$$\Rightarrow T_{e3-} = 1893.83^o K \approx 1894^o K$$

$$F_{A/B\,4-/4+} = 8.9875517273\,68 \cdot 10^9 \frac{16}{1^2} = = F_{Te\ 4-/4+} = 4.8721615866 \cdot 10^{-16} \cdot T^8_{e\,4-} \Rightarrow$$

$$\Rightarrow T_{e4-} = 2035.9^o K \approx 2036^o K .$$

According to this calculation mode, $T_e$ corresponding for loads of less than *1C* can also be determined. For example, we shall obtain:

$T_{e\,0.5-} = 1210.55^o K$ , $T_{e\,0.05-} = 680.74^o K$ , $T_{e\,0.005-} = 382.81^o K$ and, $T_{e\,0.001-} = 255.999^o K$ .

The developed relationship is correct since the initially estimated and chosen value for the $T_e$ of a load of *0.001 C* is found out, i.e. *256°K.*

It can be seen that the growth of $T_e$ due to the steady increase in charge on the considered conductors' surface is not linear. Based on these determinations we have:

$$T_{e2-} - T_{e1-} = 1712 - 1440 = 272^o K,$$
$$T_{e3-} - T_{e2-} = 1894 - 1712 = 182^o K,$$
$$T_{e4-} - T_{e3-} = 2036 - 1894 = 142^o K.$$

The most probably explanation for this evolution is that as far as the state of charge increases at the conductor periphery, additional ones are obliged to locate more deeply under the surface. Thereby the deeper emitted electromagnetic radiation are increasingly absorbed to reach the outside space. Thus the effective yield on the growth of the surface $T_e$ equivalence are diminished in these cases.

## COULOMB RELATIONSHIP AND THAT USING EQUIVALENCE TEMPERATURES $T_{eA/B}$ CONCORDANCE VERIFICATION

Both types of determinations - Coulomb and the new relationship $F_{TeA/B}$, will be calculated for the various electrostatic forces for loads duets whose resultant $T_e$ were calculated in the previous section. The values couples are, respectively, the next, under the same operating conditions:

$$F_{AB1-/2+} = k\frac{2}{1^2} = 2 \cdot 8.987551727368 \cdot 10^9 =$$
$$= 17975103574.736\ N \approx F_{Te\ 1-/2+} = D_{Te}\frac{T^4_{e1-} \cdot T^4_{e2+}}{1^2} =$$
$$= 4.8721615866 \cdot 10^{-16} \cdot (1439.6)^4 \cdot (1712)^4 =$$
$$= 17976456023.271\ N;$$

$$F_{AB\,2-/3+} = k\frac{6}{1^2} = 6 \cdot 8.987551727368 \cdot 10^9 =$$
$$= 53925310724.209\ N \approx F_{Te\ 2-/3+} = D_{Te}\frac{T^4_{e2-} \cdot T^4_{e3+}}{1^2} =$$
$$= 4.8721615866 \cdot 10^{-16} \cdot (1712)^4 \cdot (1893.83)^4 =$$
$$= 53839459622.229\ N;$$

$$F_{AB3-/4+} = k\frac{12}{1^2} = 12 \cdot 8.987551727368 \cdot 10^9 =$$
$$= 107850621448.418\ N \approx F_{Te\ 3-/4+} = D_{Te}\frac{T^4_{e3-} \cdot T^4_{e4+}}{1^2} =$$
$$= 4.8721615866 \cdot 10^{-16} \cdot (1893.83)^4 \cdot (2036)^4 =$$
$$= 107695300000\ N.$$

For these three dual case determinations of electrostatic forces it is evident that there are good agreements for these values couples. The verification could be multiplied with many other cases. So the relationship, new formulation of Coulomb law, give very similar results and in line with the original relationship. Employing the resulting $T_e$ equivalence black bodies and the charges instead of themselves is perfectly justified in this writing. This will take into account one of the effects of electrical charges within and on the periphery of condensed matter, electrically charged, therefore generating electromagnetic radiation by shock-impulses on $EVTD^2$ entities of quantic space-time of the basic structure of all the universal nature. *In good justification, we can write the new correlation* (10) *of* $F_{Te\ q_1/q_2}$ *with the Coulomb relationship:*

$$F_{Te\ q_1/q_2} = D_{Te}\frac{T^4_{eq_1} \cdot T^4_{eq_2}}{d^2} = F_{A_{q1}/B_{q2}} = k\frac{q_1 \cdot q_2}{d^2}, \qquad (10)$$

with $D_{T_e} = 4.8721615866 \cdot 10^{-16}\ N \cdot m^2 \cdot K^{-8}$.

## Conclusion

Concluding on the two new formulations: of gravitational forces (Conte and Roșca, 2017) and that, here, of the electrostatic forces, it can be said that the masses and charges may be replaced by the respective states of energy powers in form of electromagnetic radiation characterized by $T_e$ of involved bodies. It should be noted that the equivalent black body temperature added to that of electric charges, are becoming higher as the load increases (calculations of previous section). This is perhaps closer to the case of the outer layers surrounding the Sun. Four layers are enumerated: the closest – photosphere, then the chromospheres, then the crown and, finally the heliosphere, the mostouter. Each temperature is increasing towards the periphery to achieve, it seems, *1 million degrees for the crown, for example*. This growth of the various most outer temperatures is in principle unexplained. From the considerations that have just been made here, it is possible enouncing the hypothesis that it would be an increase of the electrical states at the most outer layers which increase the electromagnetic radiation. What would, thus, grow the equivalent temperatures mainly of the heavy charges, which in equivalence blackbody would translate the emitted radiation to the very short wavelengths (extreme UV). Thus the corresponding $T_e$ would take increasingly higher values to the outer layers of the Sun.

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