GENERAL DETERMINISTIC THEORY OF FIELDS

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Abstract: In part-I, first the nature and the structure of four dimensional space and time is examined, the four dimensions are represented in a complex plane and based on the facts found, a general expression for field radiated by any particle known and unknown is derived. In the next section, the relationship between space, time and the field are examined based on the special and general theories of relativity and a general expression for field radiated by any known and unknown particle is derived. In the last section, the validity of the formulae derived are checked for analyzing the birth, growth and the death of a star. In part-II, General expression for field radiated by a matter particle is derived from the special theory of relativity, Newton and Coulomb laws of forces and the radiation theory of fields. Various terms of the general expression of fields radiated by a matter particle derived are identified with the fields of nature and explained.

Key Words: **Space, time and field concepts and relations, General field theory and applications to astrophysics, Relativity theories, Gravitational field and Unified field theory.**

I. INTRODUCTION

In the previous article [1] article, first the force acting on energy and field were examined and expressions relating the space, time and field are derived. The assumption made in the general theory of relativity is proved to be not required and the space of general theory of relativity is proved to be a non linear function of absolute space. The classical electromagnetic field theory and the special theory of relativity are proved to be true only approximately in the far field regions of the source of radiation. Finally, a general formula for field radiated by a mass or equivalent charge is derived which includes all fields radiated by all known and unknown particles of the universe. In the next article [2] first forces acting on a matter particle are examined and expressions for new fields acting on the mass are derived. Similarly in the second section, forces acting on an energy particle are examined and expressions for new fields acting on the energy particle are derived. The relations derived in the first two sections prove that the field radiated by a particle has higher order terms of r (radial distance from the source of radiation). Therefore, in the final section, relationship between the theories of relativity is examined and a simple analytical expression for all fields radiated by all known and unknown particles is derived. In the article [1], the field acting on a matter particle is examined first. In the analysis of the previous article, both wave and quantum particle concepts were used. In this article, field acting on matter particles are analyzed by applying wave and classical mechanic concepts. The analysis shows that the field acting on the matter particle has 4^{th} order term in r. The presence of a 4^{th} order term proves the existence of a additional near field component. Therefore, it encourage the generalization of the radiated field by a particle and in the next section a general expression for field radiated by a particle is derived based on a qualitative theory. In the last section the same expression is derived based on a quantitative theory. In part-I, first the nature and the structure of four dimensional space and time is examined and based on the facts found, a general expression for field radiated by any particle known and unknown is derived. In the next section, space, time and the field relations are examined based on the special and general theories of relativity and a general expression for field radiated by any known and unknown particle is derived. In the last section, application of the formulae derived to astrophysics is checked and origin of singularities and black holes are proved to be due to unrealistic assumptions made in developing gravitational field theories. A new and accurate model of a particle is developed and based on this new model, the history of star formation, growth and death is proved to be cyclical and eternal.

As per the general theory of relativity, Newton's gravitational laws are proved to be valid only to solve limited cases of astronomical and astrophysical problems [6]. General theory of relativity is proved to be valid to solve a large class of problems of astronomy and astrophysics, even though the general theory of relativity is not yet verified by observational and experimental methods beyond any reasonable doubt [6]. Moreover, Newton's law of gravitation with little modification is good enough to explain a large class of astronomical and astrophysical problems like the general theory of relativity [7]. Albert Einstein assumed that the space and the field are one and the same while building and developing the theory of relativity [4]. But he himself contributed to the development of special theory of relativity which was developed within the Euclid's space with the assumption that the space and field are different [3]. Both the quantum mechanical theory and the quantum field theory were developed in the Euclid's space [8]. Such contradictions and doubts are the biggest obstacles in the way of integrating all types of fields and developing a general theory of fields. The same is the reason for not being able to derive the general theory of relativity from the special theory of relativity. Therefore, in this article, a general equation of fields which includes Newton, Einstein, Nuclear and Electromagnetic fields is derived from the special theory of relativity and the Newton's gravitational laws. In part-II, first a general expression for field radiated by a matter particle is derived from the special theory of relativity. Then the mass-charge equivalence is established by comparing Newton and Coulomb laws of forces. Model of a particle is is developed by applying the atomic and particle theories of physics. Based on the model of a particle developed and the radiation theory of fields [9] various terms of the general expression for the field radiated by a matter particle are identified with the fields of nature and explained.

II. PART-I: NATURE OF FOUR DIMENSIONAL SPACE AND TIME

2.1. 4-D Space and time structure

As per the special theory of relativity, time is identified as the 4 th dimension of the space [3]. Therefore, in the combined space-time coordinate system, at time t =0, the space r = o. Therefore, in the four dimensional space-time coordinate system, r = 0 and t = 0 is the point of origin. In the Euclid's space and time structure the particle under observation moves in the absolute 4 - d space- time structure from the origin of the coordinate system (at r = o and t =0). Counting and tracing the path of the particle begins at r=0 and t =0. So, the 4 – d coordinate system originates from the point of the origin and moves at the speed of the clock's needle at the origin. In other words, space and the time originate and move simultaneously at the clock's speed. Each point in the absolute space could be taken as the origin of the coordinate system. Therefore, r = t. The clock's movement in the space could be described in the complex plane by $R = e^{\pm j\theta}$ or $e^{\pm jkt}$ where k is a scale factor. But space and the time are in the real domain and not in the complex domain. The 4 –d space and time could be represented in the spherical coordinate system by converting the real variable r into a complex plane variable as r. $e^{\pm jkt}$. Therefore, each point in the space could be treated as a clock in the imaginary plane. As per the electromagnetic field theory of radiation, field is inversely proportional to r. Therefore, field and the space are interchangeable. Field is a real function and r = t. Therefore, field, time and the space are equivalent real variables. Therefore, they must be represented by the real variables. This is possible only if the scale factor k is an imaginary number. This imaginary scale factor is possible since the clock assumed is only an imaginary time clock. Therefore, time is represented by $e^{\pm t}$ and since time and the space are equal, space is $e^{\pm r}$. By applying Taylor's series, $e^r = 1 + r/1! + r^2/2! + r^3/3! + \ldots$ In the far field region the field radiated is inversely proportional to the radial distance from the point of origin. In the near field regions, it is inversely proportional to r^2 as per the laws of Newton and Coulomb. Therefore, field radiated by a particle = $F(r) = \sum K_n/r^n$ where K_n , n = 1,2,3… are proportionality constants.

2.2. Integrated space, time and fields

If the speed of electromagnetic signal is constant, the dr/dt = constant. Therefore, r = ct. This r is distance travelled by the electromagnetic field. Distance travelled by the wave and the speed are always measured with reference to the origin of the 4-d coordinate system. Therefore, 4-d coordinate system could be represented by the variables r and c. Since r = ct, the space, field and the time are equivalent in 4-d space-time structure. This means field radiated also originates from the origin of 4-d coordinate system. In this case scale factor k = c. In the previous case scale factor k = 1 and therefore, r = t. Instead of assuming that the space and time both originates and moves at the same time, space could be fixed and taken as reference as in the case of absolute 3-d space and time. In this case space and time are separated. Therefore, if time goes to zero, space does not.

Time and the field/energy originated at the origin of the energy/field in the eternal absolute space. If the space and field are assumed to be the same, space originated at zero time. This space/field is moving at the speed of energy or light. In the 4-d space and time structure, space and the time originates at the same point, since as time goes to zero, space also goes to zero. Since the time and energy originated at zero time in the absolute space, the space with the energy or field originated at zero time. This is relative space to the absolute space. Therefore, space of general theory of relativity [4] exists within the absolute space. Therefore, energy or speed of light integrates the space with the time. Therefore, in the integrated 4-d space-time structure, energy is assumed to originate at the point of origin of absolute space.

Field radiated is inversely proportional to r as per the electromagnetic field theory of radiation. Therefore, space and the field are interchangeable and are equivalent. Therefore, real 4- d space-time can't be represented in the complex plane. Field is continuously radiated. Therefore, field is moving relative to the space. Field movement relative to the space is geometrically described by the Faraday's lines of forces. In other words, field is described by discrete lines of forces. Field is also measured by the flux density. Therefore, field, space and the time are in discrete form. They can be represented by impulse train functions in space and time domains. Therefore, field at a point in the space is directly proportional to $e^{\pm t}$ or $e^{\pm r}$. Therefore, like in the previous section, field radiated by a particle = $F(r) = \sum K_n/r^n$ where K_n , n = 1,2,3… are proportionality constants. This general equation is valid for the field radiated by the charges also as per the mass-charge equivalence principle explained in the next section.

2.3. Mass and the charge equivalence [3 5]

In electromagnetic field theory, Euclid or linear space is used to formulate all problems. Only in gravitational field theory space is assumed to be curved. But Newton's law of gravitational field is comparable to Coulomb's electric field laws. Therefore, if the space is really curved, the space of electromagnetic fields should be proved to be curved. But no such evidences are available in the literature. Mass and Charges are proved to be equivalent sources of fields, if we compare the Newton's Law of gravitation [3] with the Coulomb's law of electricity [5]. Electric Charge is equal to $\sqrt{G4\pi\varepsilon}$ X Mass. This relationship establishes the link between fundamental units of electric and gravitational fields. This is another evidence to prove that space is not curved.

2.4. Application of the general field theory to astrophysics [6]

In the previous sections, Newton and Coulomb's field components were integrated with the field components of general theory of relativity and the near field radiated components by four different methods. These fields are proved to be radiated by an oscillating dipole. But an atom consists of so many elementary particles connected together. Therefore, model of a particles as a single dipole radiator of the fields is a very crude model and not valid for applying in the nuclear physics. Therefore, a general model of a particle is an array of dipoles connected together by bonds of different strengths depending upon the mass and charge of the

particles. Therefore, the field radiated by a particle may be considered as a radiator of infinite number of higher order field components. Based on this general dipole array model of a particle and the oscillatory nature of the particles, a simple analytical expression for all fields radiated by all known and unknown particles is derived at the end.

Formula derived is applicable to study the birth, growth and death of stars. However, the formula derived is based on a model of a particle like the models of Sir Isaac Newton, Coulomb and Albert Einstein. Therefore, all these models may lead to the theories like black holes and singularities. Singularities certainly arise due to unrealistic assumptions made in modeling the particles. Based on the dipole array theory of nucleus and atomic particles, if the star is compressed due to gravitational pull towards the center, under maximum pressure conditions, the charges of the poles will come closure to each other and the star will explode due to the spark generated by merging of positive and negative charges. The gravitational field theories are based only on the mass and not based on charges. That is why in many astrophysical theories mathematical singularities and the concepts of black hole, etc. originates. Therefore, the birth, growth and death of all stars are very much cyclical and eternal. The life of a very high density star is only temporary. Growth of density of a star is limited by merging of charges and subsequent explosion.

III. SPECIAL THEORY OF RELATIVITY AND GENERAL THEORY OF FIELDS

3.1. General expression for the field radiated by a matter particle [10]

As per the Newton's law of force, force **F** acting on a body of mass m moving with a velocity **V,**

$$\mathbf{F} = d/dt\ (m.\mathbf{v}) \quad (1)$$

As per the special theory of relativity,

$$m = m_0/(1 - (v/c)^2)^{1/2} \quad (2)$$

where m_0 is the mass of the body at rest and c is the speed of the light in the free space. By substituting the equation (2) into equation (1) and operating the derivative, we get,

$$F = m_0.dv/dt/(1 - (v/c)^2)^{3/2} \quad (3)$$

From the equation (3), field acting on the mass $m = F/m = dv/dt/\ (1 - (v/c)^2)$ (4)

As per the well known Newton's gravitational law of physics, field produced by a particle of mass $M = G.M/r^2$ (5)

where G is gravitational constant and r is the distance between particles of masses m and M. By equating the equations (4) and (5), we get,

$$G.M/r^2 = dv/dt/(\ 1 - (v/c)^2) \quad (6)$$

As per the Newton's laws of force, the smaller particle of mass m will be moving in a circular path of radius centred around the bigger particle of mass M with the uniform velocity 'v'. Let T be the time period required by the particle to complete one cycle of travel. Therefore, velocity of the particle $v = 2\pi r/T$ (7)

Therefore, $dv/dt = 2\pi.(dr/dt)/T = 2\pi.v/T = (2\pi/T)^2.\ r$ (8)

By substituting equations (7) and (8) into equation (6), we get,

$$k.r^3 + l.r^2 - p = 0 \quad (9)$$

where $k = (2\pi/T)^2$, $p = G.M$ and $l = p.k/c^2$ (10)

So, equation (9) is a third order equation and will have three solutions for r. This means the mass M radiates three fields. As per Newton and Coulomb's laws of forces, mass and charge are equivalent. Therefore, an atomic particle could be modelled equivalent to an electric dipole. An electric dipole radiates three fields of different orders [10].

Therefore, the field radiated by a simplest particle of mass $M = (K_1/r + K_2/r^2 + K_3/r^3)$ (11)

where K_1, K_2 and K_3 are constants. A matter particle of a specific mass is made up of many atomic particles. Therefore, a particle of mass M could be modelled as a three dimensional array of dipoles. Therefore, field radiated by a body of mass M is generalized to

$$\text{Generalized Field} = \sum K_n/r^n \quad (12)$$

where K_n , n = 1, 2, 3, 4, ... are constants.

3.2. Interpretation of the general expression for fields

The first order field radiated far field radiated by the particle. Since the field due to general theory of relativity is far field radiated by the particle of a specific mass, the first order field K_1/r is field due to general theory of relativity. The second order field K_2/r^2 is obviously due to Newton's gravitational field or Coulomb's electric field. As per the Gauss's law of electric field, the coulomb's law fails to be second order field in the near field region of the charge and becomes third order field. This third order field K_3/r^3 is Yukawa's nuclear field or weak nuclear field. A nucleolus of an atom is made up of many particles and all are very closely packed. Therefore, a nucleus could be modelled as a three dimensional array of dipoles. Therefore, fourth and higher order fields are due to strong nuclear force.

3.3. Conclusion

In part-I, a general expression for field radiated by any particle known and unknown was derived. Then in the last section, application of the formulae derived to astrophysics was checked and origin of singularities and black holes are proved to be due to unrealistic assumptions made in developing gravitational field theories. A new and accurate model of a particle was developed and based on this new model, the history of star formation, growth and death is proved to be cyclical and eternal. In part-II, the general expression for the field radiated by a particle integrates the four fields of the nature known to us and very clearly proves that space and fields are different and not one and the same. The general expression for the fields derived is very simple and eliminates all the complexities of the general theory of relativity.

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