A CRITICAL EVALUATION OF STANDARD MODEL COSMOLOGY WITH EINSTEIN CARTAN EVANS (ECE) FIELD THEORY.

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ABSTRACT

Some claims of standard model cosmology are tested with the inhomogeneous field equation of ECE field theory. The only rigorously correct line elements available at present are those given by Crothers, because they are the only line elements that are geometrically correct as well as being exact solutions of the Einstein Hilbert (EH) field equation. A small sample of rigorously correct line elements is used to produce charge / current densities of the inhomogeneous ECE field equation and it is found that at present there is no rigorously correct metric available that produces electromagnetic radiation in ECE theory. The reason is that the standard model of cosmology is based on an incorrect appreciation of differential geometry and must be disregarded for this reason.

Keywords : ECE theory, Einstein Hilbert field equation, charge / current density, Crothers lien elements, criticisms of standard model cosmology.

Paper 96 of ECE

1. INTRODUCTION

Recently a generally covariant unified field theory has been developed {1-10} that is based rigorously on the philosophy of general relativity {11}. This is known as Einstein Cartan Evans (ECE) field theory because it is based on the well known differential geometry of Cartan. The latter geometry extends Riemann geometry by use of the Cartan torsion. ECE theory has been tested extensively (www.aias.us) against experimental data and is based directly on Cartan geometry. The mathematical correctness of ECE theory is obvious, because Cartan geometry is a valid geometry, but nevertheless ECE theory has also been tested exhaustively and the results accepted by the international community of scientists (feedback to www.aias.us over three and a half years). Recently the theory has been applied using line elements {12} which are exact solutions of the Einstein Hilbert (EH) field equation. The basic equation used for this test of standard model cosmology is the inhomogeneous ECE field equation given in Section 2. This has a simple structure when written in differential geometry. It becomes a little more complicated in other notations, but at the same time can be reduced to the familiar vector notation of the Maxwell Heaviside (MH) field theory. The familiar laws of electrodynamics in ECE theory take the same form as in MH theory, but are written in ECE in a space-time that has both curvature and torsion. In MH theory the equations are written in a space-time that has no curvature and no torsion - the Minkowski space-time of special relativity. Thus ECE unifies electrodynamics and gravitation in a natural way - based directly on geometry. MH cannot unify the two fundamental fields because it is developed in a space-time that is flat and not generally covariant. The Minkowski space-time supports only Lorentz covariance as is well known.

In order to apply ECE theory, line elements must be found that are suitable for the gravitational sector of ECE. Charge / current densities are calculated from these line elements {1-10} in various approximations. In the first approximation used in this paper and previous papers on this topic, the gravitational torsion is assumed to be negligible compared with the gravitational curvature. This is a situation that exists for example in the solar system. In this approximation line elements can be used which are solutions to the EH field equation, in which gravitational torsion is absent. Crothers {13-15} has shown that such line elements must also be well behaved geometrically as well as being exact solutions to the EH field equation. At present the Crothers metrics are the only ones that are acceptable, because they are the only ones that are rigorously correct geometrically. In Section two, a small sample of Crothers metrics is used to compute charge and current densities of the ECE Coulomb and Ampère Maxwell laws. The well known line elements of the standard model are incorrect fundamentally because they violate differential geometry at a fundamental level. This incorrectness has led to the crude fallacies of Big Bang, Black Holes, and dark matter. All inferences based on this pseudo-science are false because they are based on incorrect mathematics. In Sections 2 and 3 the obvious errors in the standard model are illustrated with a few examples. Because of these errors it is concluded that at present there exists no rigorously correct line element that is able to produce electromagnetic radiation in a generally covariant unified field theory, i.e. a theory that is demanded by the philosophy of relativity.

2. TESTING WITH THE INHOMOGENEOUS FIELD EQUATION OF ECE

In the simplest type of notation {1-10} the inhomogeneous ECE field equation in the approximation of vanishing gravitational torsion is:

$$d \wedge \tilde{F} = A^{(0)} \left(\tilde{R} \wedge q \right)_{grav} \quad -(1)$$

where $\tilde{F}$ is the Hodge dual of the electromagnetic field form F and $\tilde{R}$ is the Hodge dual of the curvature or Riemann form of ECE theory. The subscript in Eq. (1) means that the gravitational sector is described by the wedge product $\tilde{R} \wedge q$, where q is the tetrad form. In vector notation Eq. (1) becomes two laws of ECE theory, the Coulomb and Ampère Maxwell laws:

$$\underline{\nabla} \cdot \underline{E} = \rho / \epsilon_0 \quad -(2)$$

and

$$\underline{\nabla} \times \underline{B} - \frac{1}{c^2} \frac{\partial \underline{E}}{\partial t} = \mu_0 \underline{J} . \quad -(3)$$

Here $\underline{E}$ is the electric field strength in volts per meter, ρ is the charge density in C m^{-3}, ϵ_0 is the S.I. vacuum permittivity, $\underline{B}$ is the magnetic flux density in tesla, $\underline{J}$ is the current density in C s^{-1} $meter^{-2}$, and μ_0 is the S.I. vacuum permeability. These are the same laws as in MH theory, but ECE derives them from geometric first principles, and is able to compute the charge density and components of the current density from line elements used in the theory of gravitation. The choice of line elements is important, because not only must they be exact solutions of the EH equation, but must also be geometrically correct {13-15}. These requirements are described in more detail by Crothers in Section 3 of paper 93 of www.aias.us. Here we base our discussion on that Section 3, using the same notation. The results are further discussed in Section 3 of this paper.

The first example discussed in this paper is the Schwarzschild class of static vacuum solutions. As shown by Eddington { 16} and Crothers {13-15}, there is an infinite number of possible solutions of the EH equation for this class of metrics. The most general form of the line element for this class ~~fo~~ of metrics has been given by Crothers {13-15} and is:

$$ds^2 = A\left(C(r)\right)^{1/2} dt^2 c^2 - B\left(C(r)\right)^{1/2} d\left(C(r)\right)^{1/2} - C(r)\left(d\theta^2 + \sin^2\theta \, d\phi^2\right) \quad -(4)$$

where:

$$C(r) := C(|r - r_0|). \quad - (5)$$

Here $A\left((C(r))^{1/2}\right)$, $B\left((C(r))^{1/2}\right)$ and C (r) are a priori unknown positive valued analytic functions that must be determined by the intrinsic geometry of the line element and associated boundary conditions. In the class of vacuum solutions the Einstein tensor vanishes:

$$G_{\mu\nu} = 0. \quad - (6)$$

The radius of curvature {13-15} is defined by:

$$R_c(r) = (C(r))^{1/2}. \quad - (7)$$

Using (4) in the EH field equation gives:

$$ds^2 = \left(1 - \frac{\alpha}{(C(r))^{1/2}}\right) c^2 t^2 - \left(1 - \frac{\alpha}{(C(r))^{1/2}}\right)^{-1} d\left((C(r))^{1/2}\right) - C(r)\left(d\theta^2 + \sin^2\theta \, d\phi^2\right). \quad - (8)$$

Crothers has shown furthermore { 17 } that the admissible form of C (r) that satisfies the intrinsic geometry of the line element and also the required boundary conditions must be

$$(C(r))^{1/2} = R_c(r) = \left(|r - r_0|^n + \alpha^n\right)^{1/n},$$
$$r \in R, \; n \in R^+, \; r \neq r_0, \quad - (9)$$

where r_0 and n are entirely arbitrary constants and α is a constant that depends on the mass of the gravitational field, but which cannot be identified with a point mass M. The line element (8) is well defined on

$$-\infty < r < r_0 < r < \infty \quad - (10)$$

and has a singularity if and only if:

$$r = r_0 . \quad -(11)$$

Since r is never equal to r_0 in Eq. (9), no such singularity occurs. There is no black hole singularity. Numerous other errors of the standard model have also been pointed out by Crothers {13 - 15}. These are irretrievable errors and so standard model cosmology must be discarded and replaced by Crothers metrics. The solution of the EH equation obtained originally by Karl Schwarzschild { 18 } is the special case:

$$n = 3, \quad r_0 = 0, \quad r > r_0 . \quad -(12)$$

Using this line element it was found by computer algebra that the charge and current densities vanish. The reason for this is that the line element (8) is Ricci flat, i.e. all components of the Ricci tensor vanish, and consequently the Ricci scalar curvature. All the line elements of the spherically symmetric and static Schwarzschild class will give this result, because they are vacuum line elements. The vacuum is defined as Ricci flat. There is an infinite number of such line elements that are exact solutions of the Einstein Hilbert equation, but only the Crothers class is acceptable as also being rigorously correct in differential geometry. In this case the inhomogeneous ECE field equations have the same vector form precisely as the Maxwell Heaviside inhomogeneous field equations. They are the vacuum Coulomb law:

$$\underline{\nabla} \cdot \underline{E} = 0 \quad -(13)$$

and the vacuum Ampère Maxwell law:

$$\underline{\nabla} \times \underline{B} - \frac{1}{c^2} \frac{\partial \underline{E}}{\partial t} = \underline{0} . \quad -(14)$$

For any line element that is not Ricci flat a finite charge / current density is obtained, as in paper 93 of www.aias.us. The correct way of computing the ECE charge current density from the original line element of Schwarzschild is from eq. (8) of this paper. In the generalization (4) of the Minkowski element, the a priori unknown A and B must be functions of $C^{1/2}$. The line element (8) is obtained form the line element (4) using the Einstein Hilbert field equation, so the line element (8) must be used to compute ECE charge and current densities, as in this paper. A Lehnert type { 19} vacuum current charge density may conceivably be obtained from a line element that is not Ricci flat in the absence of canonical energy-momentum density. In that case, the "vacuum" is a different one from that of the Schwarzschild class, all of whose members are Ricci flat. The usual definition of "vacuum" in general relativity is therefore that the Ricci tensor vanishes and the canonical energy momentum density tensor vanishes. In the Schwarzschild vacuum the ECE charge current density vanishes for all A(0) as we have seen. So ECE is rigorously self-consistent conceptually and mathematically. It is the first successful generally covariant unified field theory that can be used in electrical engineering with the inclusion of the spin connection.

The second example given in this section is Crothers' generalization of the line element for the incompressible sphere of fluid obtained in 1916 by Schwarzschild { 20}. In the notation used by Crothers in Section 3 of paper 93 his generalization is:

$$ds^2 = \left(\frac{3}{2}\left(\cos|\chi_a - \chi_0| - \cos|\chi - \chi_0|\right)\right)^2 c^2 dt^2 - \frac{3}{\kappa\rho_0} d\chi^2 - \frac{3}{\kappa\rho_0} \sin^2|\chi - \chi_0| \left(d\theta^2 + \sin^2\theta \, d\phi^2\right). \quad -(15)$$

It was found by computer algebra (using a program written by HE) that this line element obeys the fundamental equation:

$$R \wedge q = 0 \qquad - (16)$$

usually known as the first Bianchi identity. (In fact it was discovered by Ricci and Levi-Civita.) Having checked the line element in this way the computer algebra was used to find that the charge density is proportional to:

$$J^0 = \phi \left(\frac{4\cos(|x - x_0|)\kappa\rho_0}{(\cos(|x-x_0|) - 3\cos(|x_a - x_0|))^3} \right) \qquad - (17)$$

and the current densities to:

$$J_r = \frac{A^{(0)}}{\mu_0} \left(\frac{\cos(|x-x_0|)\kappa^2\rho_0^2}{9(\cos(|x-x_0|) - 3\cos(|x_a - x_0|))} + \frac{2}{9}\kappa^2\rho_0^2 \right) \qquad - (18)$$

$$J_\theta = J_\phi \sin^2\theta = \frac{A^{(0)}}{\mu_0} \left(\frac{\cos(|x-x_0|)\kappa^2\rho_0^2}{9(\cos(|x-x_0|) - 3\cos(|x_a - x_0|))} + \frac{\kappa^2\rho_0^2}{9\sin(|x-x_0|)^2} - \frac{(\cos(|x-x_0|)-1)(\cos(|x-x_0|)+1)\kappa^2\rho_0^2}{9\sin(|x-x_0|)^4} \right). \qquad - (19)$$

These are graphed in Figs. (1) to (3). These results pertain to the interior of the sphere only and depend on a non-zero primordial voltage $cA^{(0)}$ being present, proportional to the electronic charge -e regarded as a fundamental constant. Outside the sphere of incompressible fluid the charge and current densities vanish even for non-zero $cA^{(0)}$. As pointed out by Crothers, two line elements are needed for a source of the gravitational field, one for the interior of the source, another for the exterior, where the gravitational field is modeled mathematically by the center of mass, a purely mathematical concept. This is explained further in Section 3 of this paper. So if a classical electron is modeled like this, it has charge and current density in its interior, but not around it. Obviously this conflicts with the laws of classical electrodynamics, which show that an electron is a source for an electric field, and if it moves with time, radiates. To describe this correctly, a rigorous Crothers type line element is needed that gives a charge current density both in the interior and exterior of a source. None of the line elements of the standard model can be accepted because they are geometrically incorrect.

3. GENERALIZED KERR NEWMAN METRIC AND CRITICISMS OF STANDARD MODEL COSMOLOGY.

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