# The new electronic force in the gravity field equation

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**ABSTRACT**

In the general relativity theory, using Einstein's gravity field equation, find new electronic force's solution. The force is only found by the gravity equation. Therefore the force is connected by the gravity.

**PACS Number**:**04,04.20,03.50.D,04.90.+e**
**Key words:The general relativity theory**
**The gravity field equation**
**The new electronic force**
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## I.Introduction

This paper is that in the general relativity theory, find the new electronic force.

The general relativity theory's field equation is written completely.

$$R_{\mu\upsilon} - \frac{1}{2} g_{\mu\upsilon} R = -\frac{8\pi G}{c^4} T_{\mu\upsilon} \quad (1)$$

Eq (1) multiply $g^{\mu\upsilon}$ and does contraction,

$$g^{\mu\upsilon} R_{\mu\upsilon} - \frac{1}{2} g^{\mu\upsilon} g_{\mu\upsilon} R$$

$$= -R = -\frac{8\pi G}{c^4} T^{\lambda}{}_{\lambda} \quad (2)$$

Therefore, Eq (1) is

$$R_{\mu\upsilon} - \frac{1}{2} g_{\mu\upsilon} \frac{8\pi G}{c^2} T^{\lambda}{}_{\lambda} = -\frac{8\pi G}{c^4} T_{\mu\upsilon}$$

$$R_{\mu\upsilon} = -\frac{8\pi G}{c^4} (T_{\mu\upsilon} - \frac{1}{2} g_{\mu\upsilon} T^{\lambda}{}_{\lambda}) \quad (3)$$

In this time, the spherical coordinate system's vacuum solution is by $T_{\mu\upsilon} = 0$

$$R_{\mu\upsilon} = 0 \quad (4)$$

The spherical coordinate system's invariant time is

$$d\tau^2 = A(t,r)dt^2 - \frac{1}{c^2}[B(t,r)dr^2 + r^2 d\theta^2 + r^2 \sin^2\theta d\phi^2] \quad (5)$$

Using Eq(5)'s metric, save the Riemannian-curvature tensor, and does contraction, save Ricci-tensor.

$$R_{tt} = -\frac{A''}{2B} + \frac{A'B'}{4B^2} - \frac{A'}{Br} + \frac{A'^2}{4AB} + \frac{\ddot{B}}{2B} - \frac{\dot{B}^2}{4B^2} - \frac{\dot{A}\dot{B}}{4AB} = 0 \quad (6)$$

$$R_{rr} = \frac{A''}{2A} - \frac{A'^2}{4A^2} - \frac{A'B'}{4AB} - \frac{B'}{Br} - \frac{\ddot{B}}{2A} + \frac{\dot{A}\dot{B}}{4A^2} + \frac{\dot{B}^2}{4AB} = 0 \quad (7)$$

$$R_{\theta\theta} = -1 + \frac{1}{B} - \frac{rB'}{2B^2} + \frac{rA'}{2AB} = 0 \quad (8)$$

$$R_{\phi\phi} = R_{\theta\theta} \sin^2\theta = 0 \quad (9)$$

$$R_{tr} = -\frac{\dot{B}}{Br} = 0 \,(10) \quad R_{t\theta} = R_{t\phi} = R_{r\theta} = R_{r\phi} = R_{\theta\phi} = 0 \,(11)$$

## II.Additional chapter

By Eq(10),

$$\dot{B} = 0 \quad (12)$$

By Eq(6) and Eq(7),

$$\frac{R_{tt}}{A} + \frac{R_{rr}}{B} = -\frac{1}{Br}\left(\frac{A'}{A} + \frac{B'}{B}\right) = -\frac{(AB)'}{rAB^2} = 0 \quad (13)$$

Therefore,

$$A = \frac{1}{B} \quad (14)$$

If Eq(8) is inserted by Eq(14),

$$R_{\theta\theta} = -1 + \frac{1}{B} - \frac{rB'}{2B^2} + \frac{rA'}{2AB} = -1 + \left(\frac{r}{B}\right)' = 0 \quad (15)$$

If solve Eq(15)

$$\frac{r}{B} = r + C_1 + C_2 \rightarrow \frac{1}{B} = 1 + \frac{C_1}{r} + \frac{C_2}{r} \qquad (16)$$

In this time,

$$C_1 = -\frac{2GM}{c^2} \qquad (17)$$

$$\frac{1}{B} = 1 - \frac{2GM}{rc^2} + \frac{C_2}{r} \qquad (18)$$

If $C_2$ is

$$C_2 = \alpha \frac{\sqrt{G}Q}{c^2\sqrt{\varepsilon_0}} = \alpha \frac{\sqrt{G\mu_0}}{c} Q \quad , \quad \sqrt{\mu_0 \varepsilon_0} = \frac{1}{c} \quad , (19)$$

$\alpha$ is non-Dimension number, $\varepsilon_0$ is a permittivity constant., $\mu_0$ is a permeability constant.

$G$ 's Dimension is $m^3 / s^2 \cdot kg$ and $\varepsilon_0$ 's Dimension is $C^2 \cdot s^2 / kg \cdot m^3$.

Therefore, $\sqrt{G} / \sqrt{\varepsilon_0}$ 's Dimension is $\sqrt{(m^3 / s^2 \cdot kg) \times (kg \cdot m^3 / C^2 \cdot s^2)} = m^3 / s^2 \cdot C$

Therefore, Eq(18) is

$$A = \frac{1}{B} = 1 - \frac{2GM}{rc^2} + \alpha \frac{1}{c^2 r} \frac{\sqrt{G}}{\sqrt{\varepsilon_0}} Q \qquad (20)$$

To know Eq(20)'s third term, does Newton's approximation

$$\frac{d^2 r}{dt^2} = \frac{1}{2} c^2 \frac{\partial(-A)}{\partial r} = -\frac{GM}{r^2} + \alpha \frac{1}{r^2} \frac{\sqrt{G}}{\sqrt{\varepsilon_0}} Q \quad (21)$$

Therefore, Eq(20)'s third term isn't the present electronic force's term and is new electronic force's term that is found by only the gravity field equation.

## III.Conclusion

Therefore, by Eq(20) include new force, the spherical coordinate system's invariant time(vacuum solution) is

$$d\tau^2 = (1 - \frac{2GM}{rc^2} + \alpha \frac{\sqrt{G}Q}{\sqrt{\varepsilon_0} rc^2})dt^2 - \frac{1}{c^2}[\frac{1}{(1 - \frac{2GM}{rc^2} + \alpha \frac{\sqrt{G}Q}{\sqrt{\varepsilon_0} rc^2})} dr^2 + r^2 d\theta^2 + r^2 \sin^2\theta d\phi^2]$$

$\alpha$ is non-Dimension number. (22)

In this time, the point is that the Reissner-Nodstrom solution has the present electronic force.

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