

A Comparison Study on Gravitomagnetism and Electromagnetic Field

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Abstract

Our group observed pendulum anomalies during the total solar eclipse (TSE) of July 15, 2009, so Allais pendulum anomalies during TSEs were probably true. A small part of torque exerted on the pendulum from the sun and the moon strengthen each other during the solar eclipse. In other times, the torque of gravitation of the sun and the moon in most cases weakens each other. This torque may originate from gravitomagnetism of the motion of the sun and the moon; other words, the pendulum anomalies during TSEs might provide preliminary evidences which show the existence of gravitomagnetism which is similar to electromagnetic field.

1. Introduction

During the Total Solar Eclipses of 1954, Maurice Allais recorded the anomalous precession of the swing plane of a Foucault pendulum in Paris, the rotation angle of the swing plane of the pendulum jumped 13.5 degree during the two and a half hours of eclipse. He found similar result during the total solar eclipse of 1959. After him, Saxl and Allen found a change in the period of a torsion pendulum during the total solar eclipse of 1970[1]. During the total solar eclipse of July 22, 2009, my team also found similar anomalous precession similar to that of Allais. From the above pendulum anomalies, we can point out three important points: One, the swing periods of the pendulums changed; two, the rotation of the swing plane jumped backward during the eclipse; three, the anomalies occurred during total solar eclipses only. Many scientists had tried to explain them by Newton's gravitation or general relativity, without any success.

Let us try to use Lorentz gravitational force to study the pendulum anomalies based on retarded gravitation theory[2]. At first, it is reasonable to believe that gravitational action is through a field same as the electromagnetic action, travel across the universe homogeneously with the light speed, based on the similarity between the Newton's law of gravity and Coulomb's law of electricity. The idea of action at a distance must be given up, such as Einstein had pointed. Further, we believe that it is reasonable to modify and to apply Maxwellian equations and Lorentz-force equation to gravitational fields, as many textbook did.

2. Lorentz gravitational force and gravitomagnetism

Lorentz gravitational force should be Similar to electromagnetism, one thing should be emphasized that the Lorentz force of the sun or the moon acting on body at the observation point is not exactly along the direction from the sun or the moon to the observation point, a smaller component along body's moving direction is exist, it means the body's rotation momentum will not be exactly conserved. We now study the pendulum's swing motion relative to the earth, it is a local motion with a very low swing speed and in a very small space comparing to the earth motion relative to the sun. The torque of gravitation of the sun and the moon applied to the pendulum strengthen each other during the solar eclipse. In other times, the rotation moment of force of the sun and the moon in most cases weakens each other[3].

3. Conclusion

The preliminary conclusion is that the Allais pendulum anomalies during the total solar eclipses were true; they could be quasi-quantitatively explained by retarded gravitation and gravitomagnetism. Other words, the pendulum anomalies during the solar eclipses provide the preliminary evidences which show the existence of gravitomagnetism. The theory on gravitational field should be very much similar to Maxwellian Equations, the behaviour of gravitational field should also similar to the electromagnetic field.

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5. References

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