Alternating Gravity

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ABSTRACT
Modified gravity theories attempt to explain effects now attributed to dark matter and dark energy. Variations in the CMB require that any such theory must alternate between positive and negative values, meaning that gravity would sometimes be attractive and sometimes be repulsive. An alternating force law is proposed. Its predicted values for acceleration are compared to observed values at various points in the solar system.

Key words: Gravitation – Cosmology: Dark matter – Cosmology: Dark energy

1 INTRODUCTION

Pardo (2020) shows through analysis of the CMB, that any modified gravity theory must be a wave function that alternates between positive and negative values. Such a theory was proposed in Bakhos (2019). The equation proposed in Bakhos (2019) was a stopgap. It was proposed without concern for units or being scalable. It was presented for demonstration purposes. Equation1, however, has correct units and also functions in a consistent form from planetary through megaparsec scales.

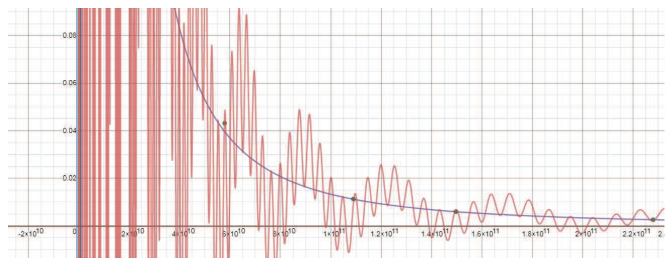

Figure 1. Solar System acceleration using equation 1 in red; Acceleration is in $\frac{m}{s^2}$. Newtonian is in purple. Green dots are planets Mercury through Mars.

2 THE PROPOSED FORCE FUNCTION.

2.1 Maths

The proposed function in equation1 has the following characteristics. It has the correct units, it is scalable, and it uses only whole-number constants or universal constants such as π and e. Finally, this function gives the correct sign for gravity for the orbits of the planets, as well as the correct sign for gravity at the surfaces of the Sun and the planets.

$$a = \frac{GM}{r^2}(1 + sin(2\pi^2 ln(r)) + cos(2\pi^2 e^2 ln(r + 2\pi\rho))) \qquad (1)$$

ρ is the radius of the central gravitational source; i.e. the Sun in Fig. 1.

Because equation 1 allows for both negative gravity and for much greater possible values for gravity at certain distances, it would be relevant to the discussion of the nature of black holes. In other words, it might be possible that a neutron star would have sufficient gravity to trap light.

Figure 2 shows orbital velocities suggested by equation 1 at galactic scale. This is relevant to the discussion of galactic rotation rates.

Figure 3 shows acceleration suggested by equation 1 at the scale of megaparsecs; this is relevant to the discussion of cosmological expansion.

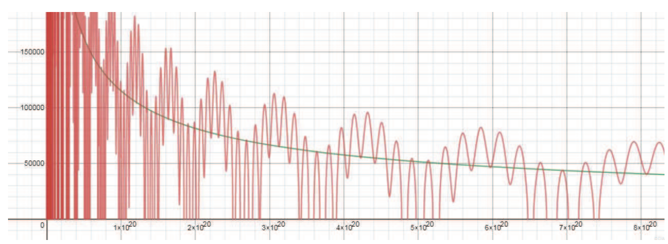

Figure 2. Velocity in $\frac{m}{s}$ at the scale of 40,000 light years. Newtonian velocity is in green. $M = 1.989 * 10^{40}$ kg, and ρ is set at $5 * 10^{16}$ m.

Table 1. Predicted, observed, and relative error in acceleration in $\frac{m}{s^2}$ due to the Sun's gravity, including at the Sun's surface.

	P	O	RE
Surface	214.1	274.8	-.22
Mercury	.0470	.0432	.08
Venus	.0192	.0112	.71
Earth	.0674	.0593	.136
Mars	.0022	.0025	-.15
Jupiter	$2.19 * 10^{-4}$	$2.2 * 10^{-4}$	.01

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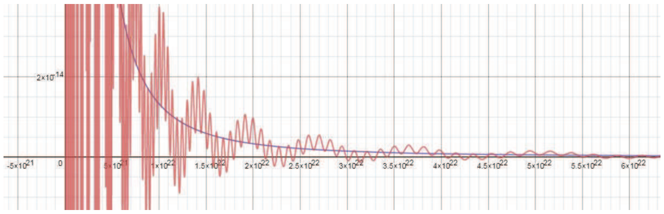

Figure 3. Acceleration in $\frac{m}{s^2}$ is shown over 2 Megaparsecs. Mass kept at $1.989 * 10^{40} kg$, but ρ is set at 1m to simulate a point mass operating at large distance.

Table 2. Predicted, observed, and relative error in acceleration in $\frac{m}{s^2}$ due to gravity at the surface of planets.

	P	O	RE
Mercury	2.43	3.70	-.34
Venus	4.59	8.87	-.48
Earth	22.94	9.81	1.34
Moon	1.68	1.65	.03
Mars	9.06	3.72	1.43
Jupiter	22.9	23.1	-.01

3 CONCLUSIONS

Tables 1 and 2 show that equation 1 does not yet very well predict accurate values for measured acceleration. It does accurately predict the sign of gravity upon the surfaces and planetary distances attempted so far. It is statistically unlikely that equation 1 would do so, unless there were an underlying relationship to reality. Investigating the viability of Equation 1 might require a rethinking of modern cosmology.

DATA AVAILABILITY

The only original data presented in this paper is equation 1.

REFERENCES

Bakhos J. W., 2019, Gravity as a Wave Function
Pardo K., Spergel D., 2020, What is the price of abandoning dark matter? Cosmological constraints on alternative gravity theories