The Massive Universe
II - Functional Gravity

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Abstract

We previously demonstrated that it is possible to describe the Gravitational Constant in terms of a simple mathematical function and in this paper we examine the first order consequences of that fact. We demonstrate that we can successfully model gravitational acceleration, escape velocity and the Schwarzchild radius without employing the Gravitational Constant or indeed any requirement for an external *force*. We conclude that Gravity is entirely an *effect* of the presence of mass, and that the applicable quantity of Gravity is directly proportional to both the quantity and density of local mass.

1 Introduction

In our first paper [1] we demonstrated that there is a theoretical place in our Universe where space is completely flat, and at this place the fundamental values we use to describe the Universe are indeed constant. However, we also demonstrated that when we introduce mass to the locale that all of the fundamental values (the "physical constants") increase or decrease in some exact proportion to the quantity of mass introduced. We can call this changing of values, the curving, bending or warping of time-space, most famously described by Einsteins Relativity.

In our last paper we demonstrated an expedient method to describe these changes, manifesting in malleable fundamental values, and describing our CODATA Universe to 99.9% accuracy. Most importantly we demonstrated that in their natural elegant state in Flat Space, the fundamental values can be described in purely mathematical terms and in this paper we examine the consequences of that fact by exploring what happens when we use a purely mathematical function for G .

2 The Experiment

In our last paper we demonstrated the Flat Space value for G:

$$G = 6.6666\overline{6} \times 10^{-11} \ m^3 kg^{-1} s^{-2}$$

Which we can alternatively express as:

$$G = \frac{2}{3} \times 10^{-10} \ m^3 kg^{-1} s^{-2}$$

Now let us look at the consequences of that fact and examine how we can resolve equations in use today to simpler, more elegant terms. First, the equation we use to calculate the gravitational acceleration, ga, caused by a body of mass m and radius r, under the supposed force of Gravity, G:

$$ga = G\frac{m}{r^2}$$

And inserting the Flat Space value for G:

$$ga = \left(\frac{2}{3} \times 10^{-10}\right) \frac{m}{r^2}$$

We find that it resolves to:

$$ga = \frac{m}{15000000000\ r^2}$$

This equation provides the exact result for the strength of Gravity of a singular massive object in an otherwise Flat Space locale. We have therefore demonstrated that we can model equations previously considered as requiring a Gravitational Constant, only by examining the mass and radius of the object!

2.1 Further Evidence

Let us examine some actual calculations requiring Gravity to see how well we can calculate gravitational effects without involving the Gravitational Constant. First let us look at gravitational acceleration on the surface of the Earth in otherwise Flat Space. In this case we are modeling the mass of the Earth alone, with no quotient allocated to model the background conditions we now know to be variable from our first paper [1].

As above, in the model we will use $6.6666\overline{6} \times 10^{-11}\ m^3 kg^{-1} s^{-2}$ or $\frac{2}{3} \times 10^{-11}$ for the force of Gravity. We employ the values 5.972×10^{24} and 6.371×10^6 for the mass, m, and the radius, r, of the Earth respectively.

Table 1: Gravitational Acceleration on Earth

	ga derived from G	ga derived from m and r
$ga =$	$\frac{2}{3} \times 10^{-10} \cdot G\frac{m}{r^2}$	$\frac{m}{15000000000\ r^2}$
$ga =$	$\frac{2}{3} \times 10^{-10} \cdot \frac{5.972 \times 10^{24}}{(6.371 \times 10^6)^2}$	$\frac{5.972 \times 10^{24}}{15000000000 \cdot (6.371 \times 10^6)^2}$
$ga =$	$9.808\ 742\ 416\ 158\ m\ s^{-2}$	$9.808\ 742\ 416\ 158\ m\ s^{-2}$

The new equation provides a 100% accurate result. Now we model the gravitational acceleration between two Earth masses at a given distance.

Table 2: Gravitational Acceleration between two Earths masses at 1,000,000 km radius

	ga derived from G	ga derived from m and r
$ga =$	$G\frac{m_1 \cdot m_2}{r^2}$	$\frac{20000000000 \cdot m_1 \cdot m_2}{3r^2}$
$ga =$	$\frac{2}{3} \times 10^{-11} \cdot \frac{5.972 \times 10^{24} \cdot 5.972 \times 10^{24}}{(1 \cdot 10^9)^2}$	$\frac{20000000000 \cdot 5.972 \times 10^{24} \cdot 5.972 \times 10^{24}}{3 \cdot (1 \times 10^9)^2}$
$ga =$	$2.377\ 652\ 266\ 66\overline{6} \times 10^{41}\ m\ s^{-2}$	$2.377\ 652\ 266\ 66\overline{6} \times 10^{41}\ m\ s^{-2}$

Again, a 100% accurate result. Now, the escape velocity of Earth.

Table 3: Escape Velocity of Earth

	v_e derived from G	v_e derived from m and r
$v_e =$	$\sqrt{\frac{2 \cdot G \cdot m}{r^2}}$	$\frac{\sqrt{m/r}}{50{,}000 \cdot \sqrt{3}}$
$v_e =$	$\sqrt{\frac{2 \cdot \frac{2}{3} \times 10^{-10} \cdot 5.972 \times 10^{24}}{(6.371 \times 10^{6})^2}}$	$\frac{\sqrt{5.972 \times 10^{24} / 6.371 \times 10^{6}}}{50{,}000 \cdot \sqrt{3}}$
$v_e =$	$11,179\ 579\ 413\ 676\ m\ s$	$11,179\ 579\ 413\ 676\ m\ s$

The new equation is again 100% accurate. Now the Orbital Speed of Earth

Table 4: Orbital Speed of Earth

	v_o derived from G	v_o derived from m and r
$v_o \approx$	$\sqrt{\frac{G \cdot m}{r}}$	$\frac{\sqrt{m/r}}{50{,}000 \cdot \sqrt{6}}$
$v_o \approx$	$\sqrt{\frac{G \cdot m}{r}}$	$\frac{\sqrt{m/r}}{50{,}000 \cdot \sqrt{6}}$
$v_o \approx$	$\sqrt{\frac{\frac{2}{3} \times 10^{-10} \cdot 5.972 \times 10^{24}}{6.371 \times 10^{6}}}$	$\frac{\sqrt{5.972 \times 10^{24} / 6.371 \times 10^{6}}}{50{,}000 \cdot \sqrt{6}}$
$v_o \approx$	$7,905.156\ 414\ 223\ m\ s$	$7,905.156\ 414\ 223\ m\ s$

Again 100% accurate. Finally the Schwarzchild radius of Earth

Table 5: Schwarzchild radius of Earth

	r_s derived from G	r_s derived from m
$r_s =$	$\frac{2 \cdot G \cdot m}{c^2}$	$\frac{m}{6.75 \times 10^{26}}$
$r_s =$	$\frac{2 \cdot \frac{2}{3} \times 10^{-10} \cdot 5.972 \times 10^{24}}{300{,}000{,}000^2}$	$\frac{5.972 \times 10^{24}}{6.75 \times 10^{26}}$
$r_s =$	$0.008\ 847\ 4074\ m$	$0.008\ 847\ 4074\ m$

3 Observation - Gravity as a Function of Volumetric Density

We have successfully demonstrated that the most important equations in physics, those that direct the mechanics of the Universe under the auspices of the force of Gravity, can all be successfully calculated without the necessity of any Gravitational Constant. It is apparent that the Universal phenomena we call the Force of Gravity, is therefore not a force at all but an inherent property of space that is manifested only in the presence of matter, its quantity duly increased in a direct relationship to the quantity and density of that matter.

To demonstrate this in the most robust way possible, we provide three resolutions of the standard gravitational acceleration equation, all demonstrating that mass and density are the only necessary inputs required to model gravitational interactions. In no instance do we require an external force of G:

$$ga = \frac{m}{15,000,000,000\ r^2}$$

$$ga = \frac{\pi \cdot \rho \cdot r}{11,250,000,000}$$

$$ga = \frac{\pi \cdot \rho}{75,000,000,000,000}$$

4 Conclusion

And so we must conclude that Gravity is a potential of effect of quantity and density of mass, as opposed to a fundamental force. The Flat Space value we call Gravity, G, is a description of what *will* happen when we introduce a spherical massive object into a formerly Flat Space, and the quantity we measure as ga is based solely on the volume and density of that object. There is in fact no external force of Gravity at all, but a descriptor of potential that informs how massive objects interact with the substrate of Space, and therefore each other, given their volumetric density.

5 Contact

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Email Public PGP key can be downloaded here:
https://mega.nz/#!g6gWUSQK!2yPN_wxPy1jk0Jc3akZwVz8c77K_N7ueBFRCA62TFs4

5.1 Model Download

The spreadsheet model can be downloaded here:
https://mega.nz/#!0jhWAbBT!OrAR0d-J9fBBhRnwWFrrkmeuUSlUwfZrkvPOQ678AJk

References

[1] A.Hughmann. “The Massive Universe I - Establishing First Principles”. viXra:1712.0011 December 2017