Is Gravity Just the Electrostatic Force?

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This a paper explores the idea that gravity is just a fairly straight forward application of the well known electrostatic force. The usual objections to an electrostatic gravity are refuted and additional evidence supporting gravity as the electrostatic force are provided. It is shown that gravity isn't the mysterious force we think it is. Gravity is simply the electrostatic force.

1. Introduction

What is gravity? Even Newton did not have any suggestions for how the force of gravity manifests itself. There have been many exotic suggestions for how gravity works. However, could it be that gravity is not that complicated? Could it be that gravity is a simple application of the electrostatic force? We know much about the electrostatic force and that both the gravity and electrostatic forces are inverse square laws and both can create an attractive force. So why wouldn't be believe that gravity is the electrostatic force? Part of the problem is that we think we understand the electrostatic force completely and that we can see some obvious contradictions in using the electrostatic force as gravity. So the idea of an electrostatic gravity is normally immediately dismissed without much more thought. We would rather think that gravity is somehow leaking out of some unseen dimension than think it is being created by the well known and obvious electrostatic force.

2. Building an Electrostatic Gravity

If gravity is just caused by the electrostatic force, how would this work? One way would be for an astronomical body like the Earth to carry a net charge. Since electrons are easily lost off of atoms, it is not unreasonable to think that electrons are blown off or simply lost to space for any astronomical object. This would leave any large object in space with a net positive charge. Once you have an object which is positively charged, this charge can then create an attractive force to other matter. It is commonly thought that a positively charged object can only attract a negatively charged object. However, this is not true. A positively charged object will also attract a 'neutrally' charged object as well. The neutrally charged object will not be as strongly attracted as a negatively charged object, but it will still be attracted. This can be experimentally demonstrated by showing how a simple charged hair comb can attract a metal butter knife which has been balanced and can rotate freely.[1] The metal knife is clearly not charged, but yet it is attracted to the electrostatic charge.

One possible mechanism for this attraction is electrostatic induction[2] whereby the positive charge causes the electrons in the metal to migrate towards the positive charge, then the positive and negative charges can then attract one another – even though the metal knife remains neutrally charged overall. In another similar experiment with a spinning charged straw shows that if you reverse the experiment and you place a neutrally charged object like your hand or a metal knife next to the positively charged straw, it is still attracted to the neutrally charged matter. It does not appear to matter what the neutrally charged matter is made out of. It can be glass, wood, metal and it will still attract the straw. The force that is observed is all attractive. This is similar to the force of gravity which attracts all matter regardless of composition. The only case where you would not observe attraction would be if you brought in another positively charged straw, in which case you would see the repulsion of similar charges. However, the vast, vast majority of the matter on the Earth and any other object is neutrally charged. This method of attraction would predict that negative charges would accumulate at our feet which are closest to the ground. This doesn't seem to be something that we've observed and wouldn't account for gravity's effect on our entire body, not just the part closest to the ground.

Another possible mechanism for the attraction of a positive charge to neutral matter is called the "dielectrophoresis force".[3]

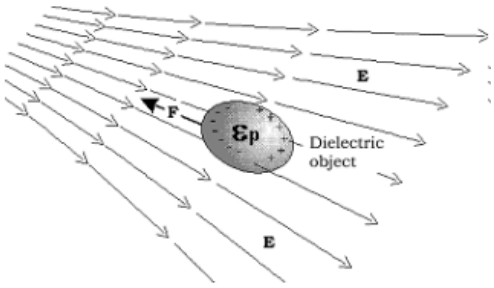

Fig. 1. Dielectrophoresis causes a particle to be attracted

The way this force works is that the positive charge causes the dipoles (attached positive and negative charges) to orient themselves such that the negative end of the dipole is facing the positive charge. The negative charge doesn't move like it would for electrostatic induction, it just flips around to face the positive charge. Because there is some distance between the positive and negative ends of the dipole, this means that the negative end is slightly closer and slightly more powerful that the positive end of the dipole which is facing away from the source of positive charge. Since the negative side is stronger than the positive, it drags the negative pole closer to the source of positive charge. So this also creates an attractive force. This form of attraction would predict that if you measured the alignment of the dipoles in our body, you would find that they are aligned to the gravitational field with the negative sides of the dipoles pointing towards the Earth. This is something which we could experimentally determine.

Regardless of the mechanism behind the attraction, it appears clear that neutrally matter has been experimentally shown to be attracted to charged objects. If we are looking for the origins of gravity, the first thing we should look for is something that can create a force of attraction on any matter regardless of composition. The electrostatic force can provide such an attractive force and is therefore a good candidate for gravity.

The electrostatic force would also connect to and be governed by the individual charges in matter. This would trivially explain why the gravitational mass which we measure as "weight" depends on the amount of matter. Ultimately, all "matter" is made out of a combination of positive and negative charges. The amount of charges in an object would be directly proportional to the amount of "matter" it contains and would also be directly proportional to its weight.

Even if it turns out that gravity is not related to electrostatics, under the currently understood laws of electrostatic physics, if the Earth contains a net positive charge, then we must be attracted to the surface as a simple matter of electrostatic law. At least some of the "weight" that we register on the Earth must be due to the electrostatic force if the Earth contains a net charge.

3. Experiment to show electrostatic gravity

What isn't very clear is how strong the force would be between a charged object and a neutrally charged object for bulk matter. To find this out, one would need to setup an experiment where you take a sphere and charge it up slightly and then bring a neutrally charged object nearby and measure the relationship between the distance and the force on the neutral object. However, despite the ease of performing such an experiment, very little can be found in the literature describing the results of such an experiment. All electrostatics experiments described in standard physics textbooks only mention finding the force between oppositely charged objects and never between a charged and neutral object. If the mechanism behind the attraction is dielectrophoresis, then it has been calculated that the force relationship should be $1/r^3$ which is different from gravity which should be $1/r^2$. However, calculations cannot replace physical experiments. Dielectrophoresis still depends on charges separating within large molecules. Since gravity is directly related to mass, the electrostatic force would have to work on the individual dipoles contained within each atom. If the hypothesis that gravity is caused by the electrostatic force is true, then a prediction of this hypothesis is that you would observe a 1/r^2 force which depended only on the mass of the neutral object. This is an actual experiment which could be performed to confirm this hypothesis.

4. The Charged Earth

It has been shown that the Earth is surrounded by a very powerful electric field[4]. This electric field has a potential of gaining 120 volts per meter above the ground. This means that between your feet and your head is about 200 volts. We also observe constant lightning activity across the Earth which indicates a great deal of electrical activity. We also observe in these lightning clouds that the majority of the negative charges gather near the bottom of the cloud while the positive charges gather near the top as shown in Fig 2. There is no consensus on why these charges separate, but if you consider that the Earth is a positively charged ball, it would attract the negative charges towards the bottom of the cloud and repel the positive charges towards the top. Furthermore, when lightning strikes, it is primarily moving negative charges from the cloud to an apparently positively charged Earth.

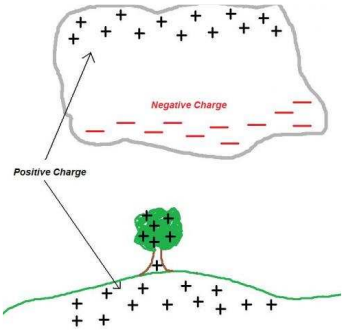

Fig. 2. Charge separation in a cloud

The actual details of the strength of the electric field and how this field changes during a thunderstorm is very complex[5]. However, the evidence points to an electrically active Earth and all that is needed to create an attraction is for the Earth to be very slightly positively charged.

5. Small Charges Add up

The amount of positive charge that is required to reproduce a force as strong as gravity is very small - so small as to be unmeasurable for any reasonable sized mass. Conventional science will tell you that the Earth is completely neutrally charged. What this really means is that to the degree that we can measure a charge on the Earth (which is limited), it has no charge. But even the tiniest of imbalance of charges add up to a very large effect. The electric charge is very diffuse and distributed all over the Earth. However, that charge, due to the laws of electrostatics acts as if all the charges in the Earth were located at a singular point at the center of the Earth[6]. This is quite a remarkable effect. The result is that you get a strong summed up electrostatic field, but without the charges being anywhere nearby. It is like the electric field is disconnected from the actual charge that creates it. For example, the Earth could be creating an electrostatic field that would be the equivalent to standing next to a 1 million volt electrode, but you don't get electrocuted by this electrode because the force is due to the diffuse charges added up all around the Earth. This is perhaps the major difference between electrostatic fields that we can generate locally and electrostatic fields which act as gravity. The gravity electrostatic field has to be created by a large amount of slightly charged mass instead of being created by a local large charge displacement.

6. Defeating Gravity

A purely mathematical description of gravity as a $1/r^2$ force does little to explain how to eliminate or reverse the force of gravity. However, if we consider gravity as merely the positive electrostatic force acting on atomic dipoles, then several possible means of defeating gravity come to mind. One possibility is to simply charge an object with a positive charge. This will work against the natural positive charge of the Earth and you should see some weight reduction. This might be practical for space rockets where any reduction in weight saves a great deal of money. This hypothesis would predict that if a rocket were positively

charged and kept charging it as it flew by continuously stripping electrons from it, it would fly higher, farther and less expensively than a non-charged rocket.

On a smaller scale, I conducted an experiment where I blew soap bubbles while I was connected to a Van DeGraff generator which created a positive charge on the dome. When the Van DeGraff generator was turned off, the bubbles were observed to drop to the ground. When the generator was turned on in this experiment, some of the bubbles did seem to rise rapidly as if they had been filled with helium. To check to see if this was just the result of bubbles being repelled from the Van DeGraff generator, I reversed the polarity on my generator so I blew negatively charged bubbles. The result was not only did they just all drop to the floor, but they seemed to drop faster. This both supports the idea that the Earth is radiating a positive charge field and that gravity can be negated through electrostatic means.

Another possibility is that if the electrostatic force is connecting to the dipoles in the atoms and the dipoles are all pointing in a preferential direction to align with the electrostatic force, then it may be possible to weaken this force by forcing the dipoles to take up non-aligned directions. One way of doing this is spinning an object which would tend to scramble the orientations of the dipoles. Experiments performed by Brian DePalma confirm such an anomaly[7].

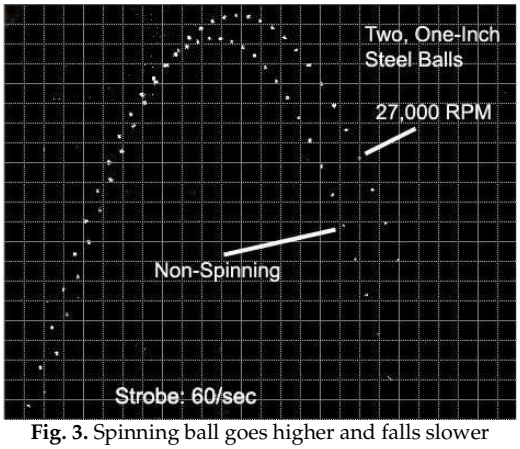

Fig. 3. Spinning ball goes higher and falls slower

There may be other ways of scrambling the dipole orientations by using a rapidly rotating electrostatic or magnetic fields. The key is that an electrostatic explanation for gravity opens up an entirely new avenue of research for controlling gravity. The control of gravity would have a tremendous economic impact on transportation, construction and space flight.

7. Common Objections to Electrostatic Gravity

Thinking of gravity as the attraction of neutral matter to the charged Earth seems to be a fairly straight forward explanation. Why is it that this explanation has been largely ignored? One obvious problem is that in order for this hypothesis to work, all astronomical objects like the Earth, Moon and Sun all have to be positively charged. The hypothesis would predict that all astronomical objects are surrounded by a positive electric field since it is only the electrons that can get blown off the surface. The Earth does not orbit the Sun because the Sun is negatively charged and the Earth is positively charged. Both must be positively charged and since similar charges repel, the Earth should be repelled by the Sun. Therefore an electrostatic gravity is impossible.

However, remember that neutrally charged matter which makes up 99.9999999% of the matter in a celestial object is attracted to any point charge source. To the Earth, the sun appears as a point charge source and almost every bit of matter in in the Earth is attracted to that source. A tiny, tiny, tiny fraction of the Earth has a net positive charge (.0000 -follow with about 37 zeros ... 01%) which is actually repelled from the sun, but it is such a tiny fraction that it is overwhelmed by the abundance of neutrally charged matter attracted to the sun. So it is possible two objects which are net positively charged to still be attracted to one another. What is neglected in the 'obvious' objection is that neutral matter is attracted to point electrostatic charges. In our common experience, when take socks immediately out of the dryer, they are stuck together with static electricity. The socks don't repel each other even though they all must have the same net charge coming out of the dryer. There is a balance point where the attraction of the neutral matter overpowers the repulsion of the similar charges. So it is quite possible for net positively charged objects like the Sun and Earth and the Moon to still attract to one another. This could be proven by running an experiment like the one described in section 3.

Another reason to reject an electrostatic gravity is because gravity is so much weaker than the electrostatic force. Gravity is only 1/1(followed by 37 zeros) the strength of the electrostatic force. So of course, it couldn't possibly be the same thing. Or could it? The simple explanation here is that gravity is a diluted electrostatic force. If you took a group of 1 x 10^37 atoms and removed just one electron from that group, it would produce a force which is exactly equivalent in force to gravity. The magnitude of the force is actually irrelevant, you can always dilute a stronger force into a weaker one by spreading it across more mass.

Finally, gravity cannot be electrostatic because gravity is only attractive and the electrostatic force both attracts and repels. However, this argument completely ignores the fact that neutrally charged matter is unconditionally attracted to any point charge. This is the all attractive force we see as gravity. We don't see gravity as a repulsive force since it can only be generated by large slightly charged masses. These slightly charged masses can only attract one another. All of these "obvious" objections and others can be easily dismissed if one takes the time to do a careful analysis of how an electrostatic gravity could work.

8. Conclusions

This paper has attempted to show that gravity could simply be an aspect of the well known electrostatic force. It is just the attraction of neutral matter to a point charge source and all astronomical objects act like a point charge source. This starts by simply observing that charged objects like an ordinary hair comb can attract neutrally charged matter and then extending that attractive power to the whole Earth and universe in general. This paper has not proven that gravity is the electrostatic force. However, it has provided suggested experiments which could either confirm or deny this hypothesis.

References

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