# A New Equation for Gravity

## From Wiki Work Area

By Robert de Hilster, 2008

**Abstract**

This paper describes the development of a new equation for gravity. The theory behind the equation is based on the work of Georges L. Le Sage. He proposed that there are "ultramundane corpuscles" (particles) coming at us from space. Most of these particles pass through objects, but a small number of them push the object. This causes a reduction in the number of partcles that leave the object. If the object is in space, then it is being pushed on all sides equally and there is no net force. In the case of the earth and the moon, the number of particles that pass through the earth to the moon are reduced. So there are fewer particles pushing the moon away from the earth then there are particles pushing the moon toward the earth. This net force is gravity. This new equation for gravity is based on this theory and is developed using four postulates.

## Contents

# Premise

Using Le Sage's theory, four postulates are defined. From these four, a new equation for gravity is generated. The new equation will have new parameters but their values are not known. To obtain their values, data from existing experiments or measurements will be used. The parameters wil be adjusted until the equation gets the correct results. Repeating this procedure for many data points should indicate if the equation is valid, or better than existing equations, or not valid at all.

# Value

Newton and Einstein developed mathematical models for gravity but with no known mechanism. LeSage proposed a mechanism but it has yet to be proved. Physicists like Majorana start with Newtons's equation and then add terms to fit their theory. This paper describes a new equation that is based on Le Sages theory but is totally different from Newton or Einstein. If this new equation proves as good as or better than the other equations, then maybe the mechanism has finally been found.

If we find the true mechanism of gravity, then maybe we can control it. Flying cars? Maybe not! Low gravity tunnels for easy transport? Could be.

# The Four Postulates

Postulate 4 has been changed from the original that was used in previous papers. It seemed a logical idea that the reduction rate should be proportional to density. And it still is. But a calculation made for the elliptical orbit, showed that the value for velocity gave different values if the orbiting body were alead ball instead of the moon. The equation was wrong.

It turns out that density uses volume and the volume of a lead ball versus the volume of the moon was very different. This had to be

1. **Postulate 1 – A Particle:** with mass and velocity, that imposes itself on an object from all directions. The source of the particle is not known.
2. **Postulate 2 – Reduction Rate:** As the particle passes through an object, a small number of them do not pass through. The reduction rate is the percent of particles reduced per distance traveled through the object. Initially the reduction rate is assumed to be linear.
3. **Postulate 3 – Pushing Force:** When the particle interacts with the object, and having mass and velocity, it imparts a pushing force on the object causing it to move in the direction that the particle was moving.
4. **Postulate 4 – Reduction Factor:** The reduction rate is proportional to the density of the object that it passes through. Hence, it is equal to the Reduction factor(Rf) times the density of the object.

# The Equation

The new equation is built around a specific configuration involving gravity. To see how this is done, the example of the earth and the moon is used. Figure 1 gives a starting point.

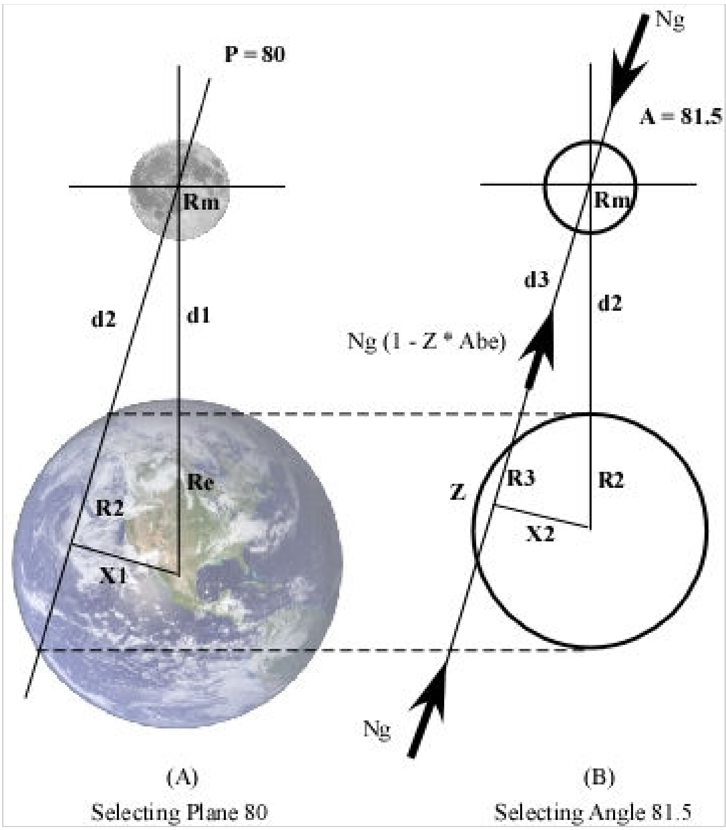

Figure 1 - Selecting the Plane and the Angle

The left side of the figure shows the earth and moon as three diemsional objects. The force of gravity is being calculated at the center of gravity of the moon. So a typical plane, at an angle of 80 degrees, is selected that goes through the center of gravity of the moon and through the earth. The right side of the figure shows the selected plane.

## The Base Equation

Two particles are shown coming at toward the center of gravity of the moon from opposite directions. Ng is the term for the number of particles in one path for a very small unit of time. It is assumed that the time can be set such that the value of Ng is always 1.

The particle that goes through the earth is reduced by the Reduction Rate (RRe). This rate is multipled by the distance through the earth (Ze) to get the actual reduction. Hence there is (1 - Ze * RRe) leaving the earth and being imposed on the moon.

To simplify the equation, the two opposing particles are added together to get the Number of Particles imposed (Npi) on the moon, for this one pair.

(1) $$Npi = Ng - Ng(1 - Ze * RRe) = Ng * Ze * RRe$$

To get the verticle component, this equation is multiplied by the sine of the angle of the plane.

(2) $$Npi = Ng * Ze * RRe * sin(p)$$

## The Double Summation

Equation 2 is for only one pair. To get all pairs a double summation is used. The number of planes could be 180 or some multiple. The number of angles could be 360 or some multiple. Adding the double summation:

$$Ngi = \sum_{p=0}^{179} \sum_{a=0.5}^{179.5} N_g Z_e RRe \sin(p) \sin(a) \tag{3}$$

The number of angles in the plane is reduced to 180, because the base equation is for a pair of particles. To get the verticle component the equations must include the sine of the angle in the palne.

**A Double Integral**

Some could argue that this should be a double integral not a double summation. There are several points to be made.

1. The first postulate suggests that there is a particle causing gravity. It is a discrete entity not a continuum. How can one integrate when the gravity field is discontinuous?

2. Many experiments have discontinuous features, such as Majorana's lead cube. A double summation with the proper supporting equations can calculate these exactly. A double integral can only approximate these values.

3. In order to calculate the value of Z, the distance through an object, requires supporting equations. How can this be done with an double integral?

As a final note: **It is more important to have the math fit the physics, rather than forcing the physics to fit the math.**

## The Equation for Force

Equation 3 provides the number of particles imposed on the center of gravity of the moon using 180 planes with 180 pairs of angles in the plane giving the total of 64,800 paths. To get the force of gravity on the moon, the following terms are added. Zm is the distance the particles travel through the moon, RRm is the reduction rate of the moon, and Fg is the mean force, in Newtons, that one particle imposes on the object.

$$Fm = \sum_{p=0}^{179} \sum_{a=0.5}^{179.5} N_g Z_e RR_e \sin(p) \sin(a) Z_m RR_m F_g \tag{4}$$

# Defining the Terms

There are five key terms in the new equation for gravity.

1. **Np** is the number of paths used in the calculation. Np is the product of the number of planes selected times the number of angles in the plane. Generally, the number of planes and angles are equal and set to a value that allows for a reasonable number of calculations. Too few calcualtions can lead to irratic results.

2. **Ng** is the number of particles per path in a small period of time.

3. **Zx** is the distance that the particle travels through object x.

4. **Rf** is the reduction factor. The Reduction Rate for object x is RRx and is equal to Rf times the density of object that the particles pass through. Rf has the units of m^2/Kg so that the term (1 - Zx*Rf*Dx) is dimensionless.

5. **Fg** is the mean value of force, in Newtons, that each particle imposes on the object

### The Process used to Calculate Force

The first four terms are initially unknown. After going through a number of calculations, the following procedure was established.

1. Assume values for the first four terms. Zx is defined by the configuration. Np is set to 1.62E+8, Ng is always 1, Rf is set to 1E-25, and Fg is set to 1.

2. Run a program to calculate the force using the new equation.

3. Based on the result, adjust the value of Rf and Fg such that the new equation will come closer to the measured value.

4. Repeat steps 2 and 3 until the calculated force is equal to the measured value.

Np and Ng are the same, but Fg and Rf have new values that allow the equation to get the correct answer. The actual results are shown below.

## The Orbital Time of the Moon

The first data point that Newton used to verify his equation was to calculate the orbital time of the moon. Using data he had at the time, and a circular orbit, he calculated the value of 27.153 days. Newton cam pretty close.

### Accuracy

There are various numbers available concerning the orbital time of the moon. The average velocity of the moon is generally stated as 1023 m/s. The average distance is 384,400 Km. However the orbital time is 27 days, 7 hours, 43 minutes, and 11.6 seconds. This value seem to be the most accurate, so it is this value that will be used. This gives a value of 27.321 days.

There is a web site on the internet that provides the maximum apogee, 4.055E+8, and the minumum perigee, 3.589E+8, for the moon. At the same time it has the minimum velocity and the maximum velocity as 964 m/s and 1076 m/s. It is not clear that these values are accurate, but they are used in the following calculations.

### Circular Orbit of the Moon

By using equation 4 to calculate the force on the moon, the following equations were used to calculate the circular orbiting time of the moon.

The gravitational acceleration of the earth on the moon:

$$ge = Fm/Mm \quad (5)$$

The velocity of the moon:

$$Vm = \sqrt{ge * R} \quad (6)$$

The orbital time of the moon:

$$T = (2 * Pi * R)/Vm) \quad (7)$$

**Newton's New Calculations**

Using the values available today, Newton would have calculated the following results.

With G = 6.67E-11, Mass of the earth = 5.98E+24 Kg, and R = 3.844E+8 meters, Newton would calcualte the following values:

Velocity would be 1018 m/s, with an orbital time of 30??? days

## The Elliptical Orbit of the Moon

To improve the accuracy of the terms, the orbiting time of the moon was calculated again, only this time the the orbit is elliptical. During the month of November 2008, the apogee and perigee values for the moon are expected to be 4.057E+8 and 3.589E+8 meters respectively. The equations used were the same except for velocity.

(8) $$Vm = \frac{\sqrt{ge * R}}{\cos(c)}$$

Equation 8 calculates the velocity using Kepler's law, g = V^2/R. The angle c is a small angle between the line perpendicular to the radius (Kepler) and the line tangent to the ellipse. The cosine term corrects Kepler's circular velocity to the elliptical velocity.

***Author's note**: It is not clear that adding the cosine of the angle to Kepler's equation is valid. Another option is to multiply by the cosine. Or is there some other math to be used. In spite of this, the results are very good.*

Equations 5, 7, and 8 were used to calculate the orbital time.

Using the process described, the value of 27.321 was forced. To get this specific value, the four key terms were adjusted to:

Np = 1.62E+8; Ng = 1; Rf = 2.7216E-13 m^2/Kg; Fg = 4.068E+5 Newtons per particle

In the process, the following chart for the velocity of the moon was made:

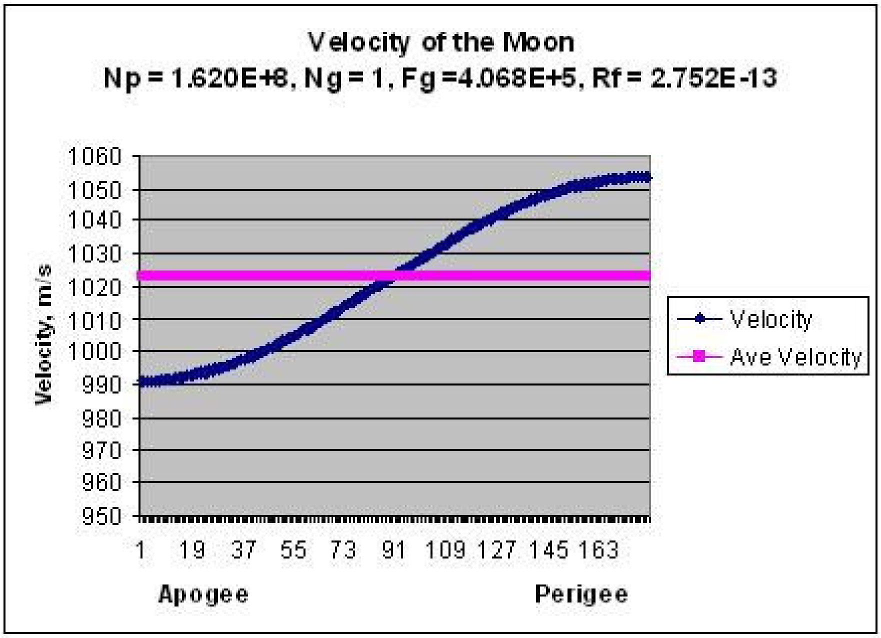


Figure 2 - Velocity of the Moon

The red line shows the average velocity as 1023 m/s. The black line shows the instantaneous velocity at apoge as 991 m/s and a perigee as xxxx m/s.

# The Velocity of the Space Shuttle

Today we have more information concering objects orbiting the earth. The space shuttle and space lab are two of these objects. To calculate their velocities, the value of g or G is needed. Fortunately this has already been done. In the paper titled "An Equation for G", presented at the 2008 NPA conference in Albuquerque NM, not only was an equation developed, but a curve for G was made that showed the values for different altitudes. This curve for G has been updated and is shown in Figure X.

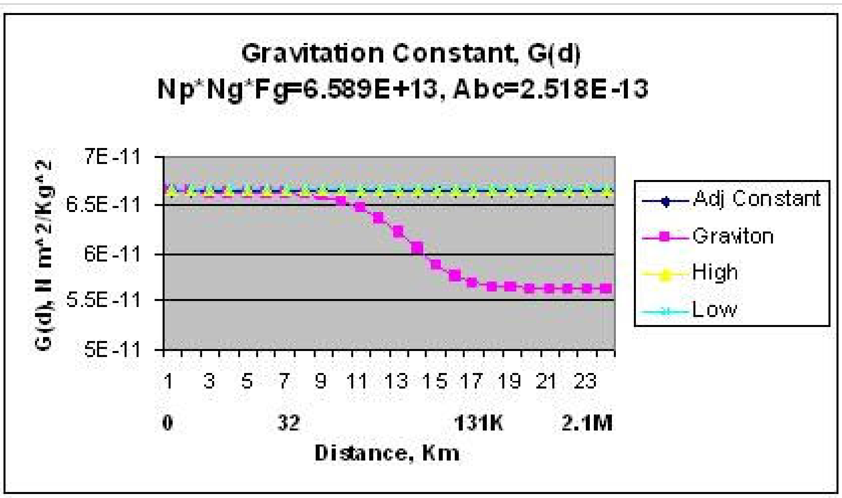


Figure 3 - Values for G

At the time the paper was presented, it was not clear if this curve was valid. By going to the spreadsheet that had the values for G, the values for velocity were added. The spreadsheet is shown below.

| | G Using the New Gravity Equation | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |
| Np | Ng | Rf | Fg | Np*Ng*Fg= | | |
| 324000 | 1 | 2.5184E-13 | 2.0339E+08 | 6.5898E+13 | | |
| | | | | | | |
| Altitude(m) | G | g | Velocity | | | |
| 0 | 6.6462E-11 | 9.801703 | m/s | Miles | Miles/hr | |
| 500 | 6.6457E-11 | 9.800171 | 891529 | 0.3 | 398513 | |
| 1000 | 6.6452E-11 | 9.798632 | 630382 | 0.6 | 281781 | |
| 2000 | 6.6442E-11 | 9.795555 | 445714 | 1.2 | 199234 | |
| 4000 | 6.6423E-11 | 9.789407 | 315122 | 2.5 | 140860 | |
| 8000 | 6.6385E-11 | 9.777127 | 222762 | 5.0 | 99575 | |
| 16000 | 6.6314E-11 | 9.752638 | 157432 | 9.9 | 70372 | |
| 32000 | 6.6180E-11 | 9.703934 | 111209 | 19.9 | 49710 | |
| 64000 | 6.5936E-11 | 9.607614 | 78492 | 39.8 | 35086 | |
| 128000 | 6.5508E-11 | 9.419226 | 55321 | 79.5 | 24729 | |
| 256000 | 6.4800E-11 | 9.058702 | 38906 | 159.1 | 17391 | Shuttle |
| 512000 | 6.3712E-11 | 8.397084 | 27279 | 318.2 | 12194 | |
| 1024000 | 6.2221E-11 | 7.274100 | 19062 | 636.3 | 8521 | |
| 2048000 | 6.0478E-11 | 5.611619 | 13289 | 1272.6 | 5940 | |
| 4096000 | 5.8799E-11 | 3.629937 | 9265 | 2545.3 | 4142 | |
| 8192000 | 5.7577E-11 | 1.874847 | 6483 | 5090.5 | 2898 | |
| 16384000 | 5.6880E-11 | 0.767793 | 4556 | 10181.0 | 2037 | |
| 32768000 | 5.6516E-11 | 0.259493 | 3212 | 20362.0 | 1436 | |
| 65536000 | 5.6458E-11 | 0.076872 | 2270 | 40724.1 | 1015 | |
| 131072000 | 5.6427E-11 | 0.021040 | 1604 | 81448.1 | 717 | |
| 262144000 | 5.6418E-11 | 0.005512 | 1134 | 162896.3 | 507 | Moon's |
| 524288000 | 5.6416E-11 | 0.001411 | 802 | 325792.6 | 359 | Orbit |
| 1048576000 | 5.6408E-11 | 0.000357 | 567 | 651585.1 | 254 | |
| 2097152000 | 5.6403E-11 | 0.000090 | 401 | 1303170.3 | 179 | |

Figure 4 - Spreadsheet for the Values of G

There are three points of interest.

1. At zero altitude the value of G is 6.46E-11, very close to the text book value. This point on the curve has been forced so that the curve matches the measured value at zero altitude. This forced the values of the four key terms as ahown in the chart. The rest of the curve uses the four key values and calculates the value of G at the specified altitude.

2. The average veolcity of the moon is 1023 m/s at an altitude of 384.4E+6 meters. This altitude is between 262.1E+6 and 524.2E+6 meters, which are both highlighted in red on the chart. The velocity of the moon for these two points are 1134 m/s and 802 m/s respectively. Exactly in the range of the actual values. Note that the correct value of the velocity of the moon can be calcualted if the value of G is 5.64E-11, not 6.67E-11.

3. The velocity of the space shuttle is about 17,321 mph at an altitude of 115 to 400 miles. This data was obtained from the internet, but velocity and altitude are not exactly matched. One point on the curve for G is at 159.1 miles and has a velocity of 17,391 mph. Although none of the values from the internet are matched together, the values are in the proper range. To get the correct values, the value for G must be 6.48E-11, not 6.67E-11.

Figure 3 is reproduced at the end of this paper. On this Figure the value of G that the shuttle would use is indicated with an arrow as is the value of G for the moon.

# It Was Amazing!

When the values of the shuttle and moon fell right on top of the curve, it was amazing. It is easy to see that using the known values of altitude and velocity would give different values for G. But it would be impossible to use that data to generate the equation for G.

The equation for G was finished in December of 2007, the calculations for velocity was done in December of 2008. Then velocity fit right on top of the curve. This was amazing!

# Conclusion

## The Value of G

The value for G is clearly not a constant.

## The Equation for G

Since the velocity of the moon and the shuttle fall on or near the curve for G, then the equation for G is valid.

***Caveat***

The values obtained for the four key terms of the new gravity equation are not the absolute values. Thery are a set of vaues that work in a specific environment. Also the value for Rf changes slightly for different experiments or measurements. So even though the results look very good, there is more work to be done.

## Is the Reduction Factor a Constant?

It is very tempting to try to get these terms to be a fixed value. There are several reasons why this is not possible, at least at this time.

1. The number of paths is probably very large. The value selected is high enough to have the calculation have some accuracy, but low enough that the time to calculate is not too long.

2. The number of particles per path, in a short period of time, is probably not 1. Individual calculations result in fractional particles, which seems impossible.

3. The average force in Newtons is dependent on Np and Ng. In this case NP * Ng * Fg is equal to 6.58E+13. Tests show that if Np is doubled, the Fg must be cut in half to get the correct result.

4. The reduction factor appears to be a constant, but other calculations show that it varies with different situations.

5. The calculation for force is made using the center of gravity of the moon. This is an approximation because the gravity particle acts on all parts of the moon.

Until more is known, or other factors like temperature are added to the equation, or more complete calculations are done, it is misleading to call Rf a constant.

## What has been proved?

In order to prove a theory, the equation that is based on that theory must make calculations that get valid answers. One failure can refute the equation. It may not refute the theory, if it was a faulty equation. So many more calculations must be done.

If the equation holds up for all known calculations, then the theory must be taken seriously, and effort should be spent tying to find direct evidence. In this case, the detailed facts about the particle should be determined. How this can be done is unknown, but someday a scientist will figure a way to do it.

## What is different about this equation?

***It Uses a Double Summation***

The theory proposed has been around for 250 years. But the postulates as stated and the new equation for gravity were started in 2006. This equation is unique since it uses a double summation rather than a double intergral and is not a variation of Newton's Law. Because of the double summation, the new gravity equation is inherently three dimensional. Newton's equation is basically two dimensional although it can be applied as three dimensional.

***It Does Not Use the Inverse Square Law***

Most equations, if not all, use the inverse square law. This equation does not use 1/R^2, and still it gets good results.

***It needs an Accurate Math Package***

The double summation requires many calculations of very small forces and these then must be added together to get the answer. To add up very small forces requires an accurate math package along with a programming language that can handle the logic. The math package used has 500 digit accuracy, although only 150 digits are displayed. To run the program, requires a computer fast enough to keep the processing time low.

Tools like these were not available to the common person until 10 years ago. So the author of this paper would never have accomplished these results unless they were available.

***The process is different!***

Once any equation is developed, then calculations are made to get the results. For the new equation for gravity, the four parameters are not known, so the calculation cannot be made without using assumptions. The process used is to assume values for the parameters and adjust them until the known result is found. The answer is forced so that the parameters can be determined.

## Are the Key Terms Correct?

It seems that value of the Reduction factor (Rf) may have a finite range for gravity, at or around the earth. But the other values are clearly not known. The value of Np, the number of paths, must be extemely high, not as low as was used in the calculations. The value of Fg, the force that each particle imposes on the object, can't be 4E+13 Newtons. That seems rediculouly high.

The correct values for Np and Fg may not be known until someone actually measures the mass, velocity, and other parameters of the gravity particle.

# References


Books:

1. "Pushing Gravity", Edited by Matthew Edwards, published in 2002 by C. Roy Keys, Inc

2. "Elements of Physics", Second Edition, copyright in 1953 and 1955, by Prentise-Hall

Papers by Robert de Hilster

1. "Gravity Experiment 1" NPA Presentation, by Robert de Hilster, David de Hilster, and Geoff Hunter. Presented at the NPA conference in May of 2007.

2. "The Graviton Equations", by Robert de Hilster, presented at NPA 2008.

3. "An Equation for G", by Robert de Hilster, presented at NPA 2008.

4. "The Graviton Experiment", by Robert de Hilster, presented at NPA 2008.

5. "Majorana's Experiments and the New Equation for Gravity", by Robert de Hilster, presented at NPA 2009.

Note: Copies of these papers can be seen on the internet at 'members.worldnpa.org'

# Junk

## Putting Them All Together

The chart below shows the values from the moon fact sheet, from Newton's equation and from the gravity equation.

Chart 1, The Velocity of the Moon

| Term | R | V(mf) | V(Ne) | V(ge) |
|---|---|---|---|---|
| **R(max)** | 4.055E+8 | 964 | 991 | 964 |
| **R(min)** | 3.589E+8 | 1076 | 1054 | 1025 |
| **G** | X | X | 6.67E-11 | 6.3E-11 |
| **Rf** | X | X | X | 2.7216E-13 |
| **Time** | X | 27.321 | 27.321 | ***27.321*** |

The process used for the gravity equation is as follows:

1. Calculate the Reduction factor by forcing the

## Comparing the Terms

Chart 1, Comparing the Terms

| Term | Circular | Elliptical | Units |
|---|---|---|---|
| **Np** | 1.62E+8 | 1.62E+8 | number of paths |
| **Ng** | 1 | 1 | number of particles per path |
| **Rf** | 2.725E-13 | 2.752E-13 | m^2/Kg |
| **Fg** | 4.068E+5 | 4.068E+5 | Newtons per particle |

Note that the only difference is the reduction factor which is slightly higher for the elliptical orbit.

## An Equation for G

A paper titled "An Equation for G" was presented a the NPA conference in 2008. After doing the calculations indicated above, it seemed possible to use the equation for G to calculate the velocity of the moon. Using equation 6, and ge = G*Me/R^2, and G = 5.64E-11 gives the following equation:

$$Vm = \sqrt{G_R * Me/R} = 1023m/s \quad (9)$$

Here's the point. The equation for G at zero altitude gives the value of 6.46E-11. This matches the value in most text books and was measured by Cavendish. But the equation for G at 384,400 Km, gives a value of 5.64E-11. There are two points on the curve that give the correct value.

This is proof that the equation for G is correct and G is not a constant. This value of G is specifically for the earth and moon. There is a similar but different equation for G for the earth and a communication satellite.