Moon Landing

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Abstract

The traditional framework for gravity calculations has remained dominated by the model produced by Newton. However, it was highlighted to be incomplete in the scene of the lunar landing. Modern science has welcomed the birth of my relational physics as a completely new theory to replace it. It made possible the description of all forces at all levels, from the large scales of the Moon's surface and the Earth's surface to the small scales of atoms and subatomic particles. From now on, this reform will be the beginning of a new era of space exploration.

Keywords: Gravity Exponent Variable; Electromagnetic Force Exponent Variable; Hierarchy Problem

Introduction

With the framework of relational physics that I have created, all the fundamental forces of nature have been unified. Of these, gravity has long been considered more difficult to deal with than the other three. However, the gravity model I have developed has made it possible to describe it with extreme precision. The same is true for the gravity calculations for the lunar landings. In recent years, countries around the world have been entering into lunar landing projects and sending unmanned spacecraft to the Moon one after another. Israel, India, Japan, and United States have all attempted to do so. However, most of these landers have either crashed into the lunar surface and were wrecked, or barely escaped wreckage and ended up upside down or overturned, and have not been able to continue their research activities adequately. If this were a manned expedition, it would be a disaster. It does not make sense for an exploration project to be able to just land. A project can be considered successful only when it completes its exploration, takes off again, and returns to Earth. Failure is unacceptable in a project where human lives are at stake. If we are going to do it, we must make sure that it succeeds. What is required, therefore, is the emergence and spread of a superior physics theory that can accurately calculate lunar gravity. Newtonian mechanics is indeed a useful theoretical system. However, it must be said that the theory of gravity is incomplete. Probably all the trials of landing projects up to now have been carried out on the basis of Newtonian theory, but in reality, they have all failed, exposing its imperfections. This tells us that we, the human race, need to abandon the old framework and hastily adopt a completely new theoretical system. In the next section, I will calculate lunar gravity using both Newtonian and relational physics models, respectively.

Methodology

Newton's theory of gravity (universal law of gravitation) is a model dealing with gravity acting between two objects, derived from Kepler's orbital law. It states that it is proportional to the magnitude of the mass of the objects [1]. The equation is as follows.

$$F = \mathrm{G}\frac{M_1 M_2}{l^2} \text{ [N]} \qquad \text{—(1)}$$

F represents gravity, G represents the universal gravitational constant (6.67×10^{-11}[$\mathrm{N}\cdot\mathrm{m}^2\cdot\mathrm{kg}^{-2}$]), M_1, M_2 represents the mass of the object, and l represents the distance between the objects. The unit is the newton (N).
Now, let us substitute each value into the above equation and calculate the gravity of the Moon. The mass of the Moon derived from the Newtonian model is 7.342×10^{22} [kg], which we will use as M_1. M_2 is the mass of JAXA's lunar probe SLIM (about 200[kg]). The radius of the Moon is 1738000 [m] [2]. The following process is used to give calculated values.

$$\begin{aligned} F &= \mathrm{G}\frac{M_1 M_2}{l^2} \\ &= \frac{(6.67\times10^{-11})[\mathrm{N}\cdot\mathrm{m}^2\cdot\mathrm{kg}^{-2}]\times(7.342\times10^{22})[\mathrm{kg}]\times200[\mathrm{kg}]}{1738000^2[\mathrm{m}^2]} \\ &= 324.2430422 \text{ [N]} \end{aligned}$$

In the same way, let us find the gravity of the Earth's surface. The mass and radius of the Earth are 5.972×10^{24} [kg] and 6378137 [m]. The following calculation process will give the values.

$$\begin{aligned} F &= \mathrm{G}\frac{M_1 M_2}{l^2} \\ &= \frac{(6.67\times10^{-11})[\mathrm{N}\cdot\mathrm{m}^2\cdot\mathrm{kg}^{-2}]\times(5.972\times10^{24})[\mathrm{kg}]\times200[\mathrm{kg}]}{6378137^2[\mathrm{m}^2]} \\ &= 1958.33931 \text{ [N]} \end{aligned}$$

Thus, the gravity values were obtained for the Moon and the Earth, respectively. Comparing the two, it can be read that the gravity of the Moon is 1/6 of that of the Earth, and the mass of the Moon is 1/81 of that of the Earth.
Let us now calculate lunar gravity using the relational physics gravity model. The formula used for this calculation takes the following form.

$$F = k_{\mathrm{b}} \frac{\pi l^2}{nm} \text{ [N]} \quad \text{—(2)}$$

This is it [3].

l represents the distance between the objects, n represents the number of parties, and m represents the mass of the object (in relational physics it can be calculate from the formula $m = \pi l^3 \mathrm{c}^2 / \mathrm{J}n$, the latest value is 1.481568 × 10^{23} [kg]). F represents a relationship, which in relational physics is synonymous with force. There is a change regarding k_{b}. The previous interpretation in my model was that it was a gravitational constant (value uniformly 10^{-13}, unit $[\mathrm{kg}^2 \cdot \mathrm{m}^{-1} \cdot \mathrm{s}^{-2}]$), but in this study it was redefined as a Scale-Dependent Conversion Constant, titled "Gravity Exponent Variable". So what will the value be? In the latest model, it has multiple values per scale. In other words, the values are now scaled discretely, 10^{-13}, 10^0, and 10^{13}, depending on the three scales: micro (particles, atoms, molecules), macro (human body, objects), and super-macro (galaxies, celestial bodies). The reasons for this will be discussed in detail later.

Since we are dealing with the problem of the gravity of the Moon, a celestial body, the number of digits corresponds to the super-macro level scale, and therefore the corresponding value, 10^{13}, is chosen. The units remain $[\mathrm{kg}^2 \cdot \mathrm{m}^{-1} \cdot \mathrm{s}^{-2}]$ as before.

Well, now we have the numbers. Let us actually calculate the lunar gravity by substituting each value into the above equation. The values are given by the following calculation process.

$$\begin{aligned} F &= k_{\mathrm{b}} \frac{\pi l^2}{nm} \\ &= \frac{10^{13}[\mathrm{kg}^2 \cdot \mathrm{m}^{-1} \cdot \mathrm{s}^{-2}] \times 3.14 \times (1738000)^2 [\mathrm{m}^2]}{1 \times (1.481568 \times 10^{23})[\mathrm{kg}]} \\ &= 640.1888109 \text{ [N]} \end{aligned}$$

Here it is. You can see that the value is almost twice the value of the lunar gravity assumed by Newton's theory.

Similarly, let us calculate the gravity of the Earth's surface. Please refer to my previous paper for the values used in the equation [4]. The values are given by the following process.

$$\begin{aligned} F &= k_{\mathrm{b}} \frac{\pi l^2}{nm} \\ &= \frac{10^{13}[\mathrm{kg}^2 \cdot \mathrm{m}^{-1} \cdot \mathrm{s}^{-2}] \times 3.14 \times (6378137)^2 [\mathrm{m}^2]}{1 \times (7.3223854 \times 10^{24})[\mathrm{kg}]} \\ &= 174.4475007 \text{ [N]} \end{aligned}$$

Here it is. Comparing the Earth and the Moon, you will notice that the gravity of the Moon is 3.67 times that of the Earth, and the mass of the Moon is 1/49th of that of the Earth.

These are the results of the calculations brought about through relational physics. Compared to the Newtonian theory, we can see a big difference. If the former's derived values are consistent with reality, then it is obvious why many of the previous lunar landing projects have failed.

Discussion

In this section, I would like to elaborate on my latest relational physics, which has been brushed up. All forces have in common that they are relationships between objects. This is true whether it is gravity or electromagnetism. If we express them in equations, they have the following forms.

$$F = k_{\mathrm{b}} \frac{\pi l^2}{nm} \text{ [N]} \quad \text{—(2)}$$

$$F = k_{\mathrm{a}} \frac{1}{l\mathrm{c}^2} \text{ [N]} \quad \text{—(3)}$$

Equation (2) is the gravity model equation already introduced, and equation (3) is the electromagnetism model equation. The changes made in this study also apply to equation (3). The change is with respect to k_{a} in equation (3). In the previous model, it was assumed to be an electromagnetic force constant (with a value of 1 and a unit of [$\mathrm{kg} \cdot \mathrm{m}^4 \cdot \mathrm{s}^{-4}$]). However, through this revision, it has been reborn as a Scale-Dependent Conversion Constant, named "Electromagnetic Force Exponent Variable". The specific method of taking values has been redefined to a Scale-Dependent Three-Step System, as was the case with the gravity model. In other words, the values are now discrete according to the different scales: micro-level (elementary particles, atoms, molecules), macro-level (human body, objects), and super-macro-level (galaxies, celestial bodies). Incidentally, the same units of [$\mathrm{kg} \cdot \mathrm{m}^4 \cdot \mathrm{s}^{-4}$] are used as before. In this respect, the Electromagnetic Force Exponent Variable and the Gravity Exponent Variable are exactly the same. However, there are some differences. The Electromagnetic Force Exponent Variables are, in descending order, 10^0, 10^{13}, and 10^{26}. The differences become obvious when summarized in a table (Table 1).

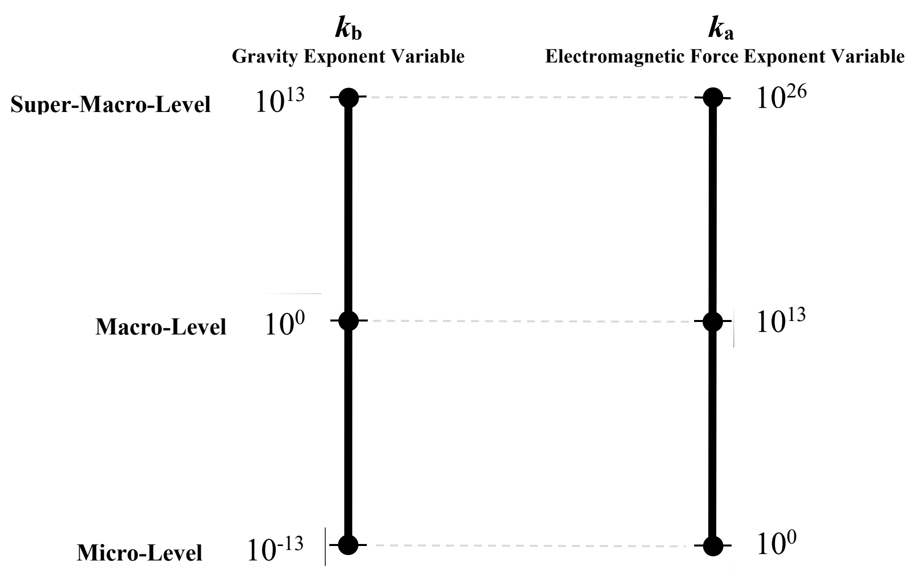

Table 1: Exponent Comparison Table by Scale

Thus, in both models, we see a sequence of digits that increases by 13 digits each time, just like the energy quantified by quantum mechanics. On the other hand, these digits are not aligned within the same scale, and there is a 13-digit discrepancy in the values. What does this mean? My relational physics is a universal theoretical system originally created through thought experiments [5]. The electromagnetic force model was derived from train experiments (light pillar formation and optical band formation experiments), and the gravity model was derived from the God's hammer experiment (mass sheet experiment). Considering the scale of the former, it is clear that it was done at the macro level. On the other hand, if we consider the latter scale, we see that it was an experiment conducted at the super-macro level. Such a differences in scale were reflected in the numerical differences in the conversion constants in those equations.
Thus, k_a, k_b contained fundamental differences in scale and numerical values from their inception. If such differences were ignored and the two models were treated in the same way, it would have led to numerical errors of several tens of orders of magnitude between gravity and electromagnetism, which would have developed into a hierarchy problem.
However, the present brush-up of relational physics has nipped such inconvenience in the bud. The 13-digits gap between the electromagnetic force and gravitational force variables skillfully avoided the occurrence of the hierarchy problem and thus made it possible to describe all forces at all scales.
Let us now look at how to handle the competing relationships of forces across different scales and between different types of forces. For example, consider an experiment in which a pachinko ball with a diameter of 1 [cm] is placed on the ground and a permanent magnet (2 [cm] in diameter) is brought close to it from above, causing it to react to the force of attraction. The question is which force is greater in magnitude, the gravitational force between the Earth and the pachinko ball or the electromagnetic force between the permanent magnet and the pachinko ball. First, let us find each of the exponential variables for both forces.

(1) Earth-Pachinko Ball Gravity

Since this problem deals with the interaction between the Earth as a celestial body and a pachinko ball as an appendage on the Earth, the applicable scale level is the super-macro level. Therefore, the Gravity Exponent Variable is $k_b = 10^{13}\ [\mathrm{kg}^2 \cdot \mathrm{m}^{-1} \cdot \mathrm{s}^{-2}]$ based on Table 1.

(2) Permanent Magnet-Pachinko Ball Electromagnetic Force

Since this is a problem dealing with the interaction between earthly appendages interwoven by a permanent magnet and a pachinko ball, the applicable scale level is the macro level. Therefore, the Electromagnetic Force Exponent Variable is $k_a = 10^{13}\ [\mathrm{kg} \cdot \mathrm{m}^4 \cdot \mathrm{s}^{-4}]$ based on Table 1.
Let us now calculate the values of forces (1) and (2), one after the other.

$$(1)\ F = k_b \frac{\pi l^2}{nm}$$
$$= \frac{10^{13}[\mathrm{kg}^2 \cdot \mathrm{m}^{-1} \cdot \mathrm{s}^{-2}] \times 3.14 \times (6378137)^2[\mathrm{m}^2]}{1 \times (7.3223854 \times 10^{24})[\mathrm{kg}]}$$
$$= 174.4475007\ \ [\mathrm{N}]$$

$$(2)\ F = k_{\mathrm{a}} \frac{1}{l\mathrm{c}^2}$$
$$= \frac{10^{13}[\mathrm{kg \cdot m^4 \cdot s^{-4}}] \times 1}{10^{-5}[\mathrm{m}] \times 299792458^2 [\mathrm{m^2 \cdot s^{-2}}]}$$
$$= 11.1265006\ \ [\mathrm{N}]$$

In (2), I adopted that value because it is said that the technical limit of the distance between the magnet and the metal is about 10^{-5} [m] when they can be brought close together by hand.
Now, as a matter of fact, a simple comparison of (1) and (2) is not enough to predict accurate experimental results. This case requires the treatment of the complex competing relationship between (1) and (2), and the relationship between the two must be considered more rigorously.
Let us organize in detail. The three parties involved here are the Earth, the pachinko ball, and the permanent magnet. At first glance, it seems that the Earth is only a party to constitute gravity between the pachinko ball and the Earth. However, the Earth is involved not only in that, but also in forming the force between the permanent magnet and the pachinko ball. Let me explain what I mean. Permanent magnets do not float alone in the air. A person holds it in his hand and supports it. And it is the Earth that holds the person in place. In other words, the gravity from the Earth is exerted on the person, and it is transmitted through the person's hand to the permanent magnet. In other words, the Earth is pulling the pachinko ball downward and upward at the same time. If this is the case, the gravitational force from the Earth (174.445007 [N]) is canceled out and need not be considered, and only the interaction between the pachinko ball and the permanent magnet (electromagnetic force = 11.1265006 [N]) needs to be assumed.
Therefore, from the above analysis, it is understood that a pachinko ball placed on the ground will fly up off the ground and stick to the magnet based on the electromagnetic force (11.1265006 [N]) composed between the pachinko ball and the permanent magnet.
As we have seen above, the brushed-up relational model can be applied comprehensively at different scales and across different types of forces.

Results

In order to perform the precise gravity calculations necessary to land on the Moon, I have further enhanced my relational physics and established a model that can describe all forces at all scales. Using this model, I calculated the lunar gravity and obtained a value of F = 640 [N]. This is twice as large as the level on which the conventional Newtonian model has relied. In the future, if we are to succeed in our landing program, it will be necessary to reintroduce the relational model as a fundamental norm in all scientific theories.

Conclusion

This universe is a clockwork organism. As such, it should have a mechanism inside that allows all of its members to interact with each other by intertwining with each other as supporting parts. Forces and energies are the relationships among the members that are built into this universe to achieve that entanglement. In order to reveal this essence, it is useful to conduct thought experiments, as I have done, using nature or the universe itself as a tool. My relational physics was born out of this and developed over time, eventually leading to the reintroduction of Scale-

Dependent Conversion Constants for describing forces and energies between objects. It is a factor involved in the determination of exponents needed to calculate physical quantities such as gravity and electromagnetic force. Through such revisions, the numerical determination of macroscopic and super-macroscopic worlds has improved dramatically in accuracy. On the other hand, for the determination of exponents in the microscopic world, the results of my previous calculations of electromagnetic force can be used as is. This is because there is no numerical change between the newly established Electromagnetic Force Exponent Variable and the conventional electromagnetic force constant.
In any case, all forces in nature are now unified within the framework of relational physics and can be described at all scales.
One can only hope that in the future it will be industrialized, self-powered, and AI-enabled, contributing to a further improvement in the standard of living of humankind.

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