…Yet we can not rest satisfied until the deeper
unity between the gravitational and electrical
properties of the world is apparent…

Sir Arthur Eddington.

"Universal Gravitation is merely residual phenomenon
of Electrical attraction and repulsion".

Faraday

EXPERIMENTAL DIFFERENCE BETWEEN MAGNETIC ATTRACTION AND REPULSION
Leading to the notion of
GRAVITATION AS AN ELECTROMAGNETIC ATTRACTIVE FORCE

by

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ABSTRACT

Gravitation's property of attraction only makes it appear different from electrical or magnetic force.

The observations and reasoning in this paper attempt to find an explanation for the gravity as the difference between vectors of attractive and repulsive forces of the total energy "content" in favor of attraction. This difference is supposed to be related to the gravitational constant.

"ACTION AT A DISTANCE."

It is customary to divide "action at a distance" into three categories:

Electrostatic force,
Magnetic force,
Gravitational force.

The first two can be attractive or repulsive. The third has only attraction.
Attempts to find a common base for these forces are not new though a common base for electrical and magnetic forces was found a long time ago from experiments with the wire and magnet.

It is well known that electrical, magnetic and gravitational forces vary with distance in exactly the same manner. This similarity has not yet been explained to satisfaction.

DIFFERENCE BETWEEN MAGNETIC ATTRACTION AND REPULSION.

During the research made on permanent magnets, the distinction between an attraction and repulsion was tested and measured. Two flat, round disc magnets about 6” in diameter, ¾“ thick, poles in two halves, sintered in hard rubber, specially made for the purpose, were installed on a stainless steel (non-ferromagnetic) shaft on linear ball-bearings. Pressures and torque were transferred to electronic digital scales.
We have as an illustration (Fig. 1) the graph of results of attraction and repulsion measured in 1-mm increments at the distance from 1 to 25 mm:

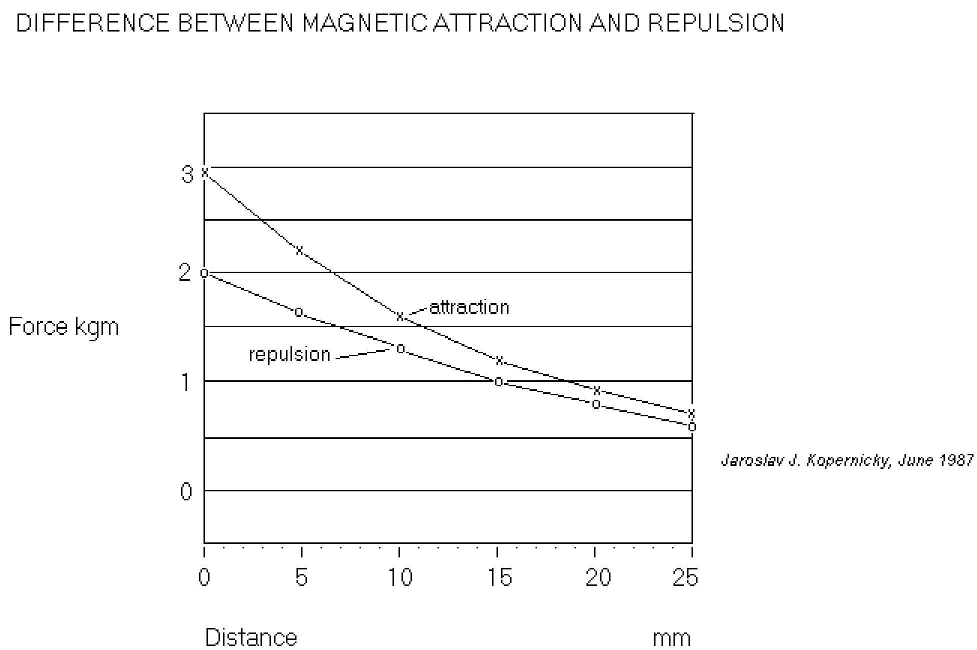

Fig. 1

The graph shows *an increase of the difference between attraction and repulsion with decreasing distance.* We can see an almost linear drop of repulsion with increasing distance and a slightly steeper initial drop of attraction; gradually leveling up toward the maximal tested distance. Variation in types or shapes of magnets has an insignificant influence on this seemingly enormous difference.
This author is puzzled why nobody (to this author’s knowledge) found it a long time before. For quite a while author actually thought that this phenomenon was widely known, because, during years of tests, the prevailing attraction was always clearly observable.

On the Fig. 3 is depicted the simple experiment showing a difference between attraction and repulsion - in favor of the attraction.

A SIMPLE EXPERIMENT SHOWING A DIFFERENCE BETWEEN ATTRACTION AND REPULSION OF THE MAGNETS. REPULSION IS ALWAYS WEAKER THAN ATTRACTION!

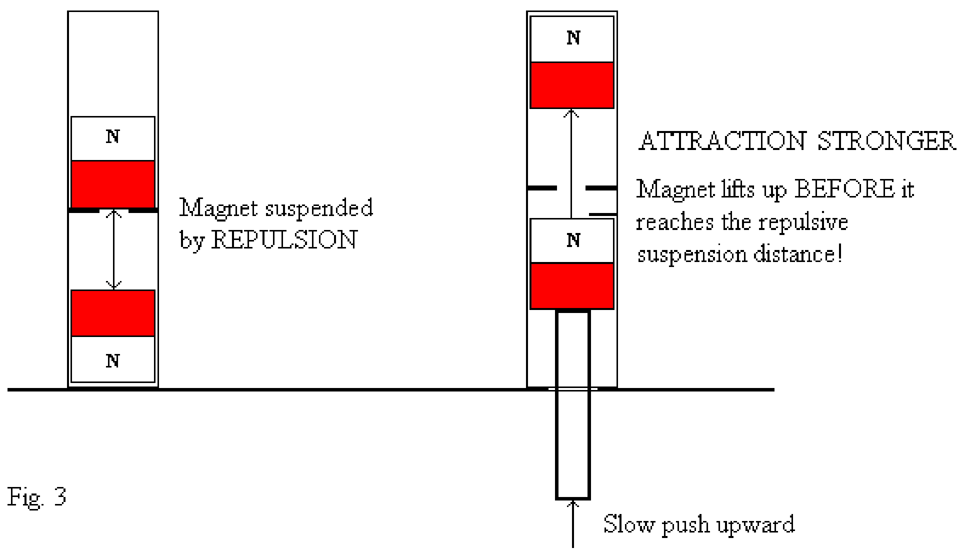

Fig. 3

ELECTROSTATIC INTERACTION BETWEEN CHARGED PARTICLES.

The positive charge is sometimes referred to as “short on electron”. Nevertheless, the absence of the electron itself cannot explain the repulsion of the two positively charged bodies. Therefore, we must also recognize positive electricity as having the same properties as the negative.

The speed of the electromagnetic force or gravity is a subject of spicy discussions. The field of force surrounding a charged particle probably started to expand its influence at the very beginning of its existence and can be thought of as building blocks of Einstein’s space - time. That might also be a reason why gravity was recognized by Newton as an instantaneous force, even if it would have a finite speed.

ELECTROSTATIC INTERACTION BETWEEN CHARGED PARTICLES AND GROUND (EARTH) POTENTIAL.

One can observe that the airborne dust in an industrial building accumulates mostly on the surface of metal objects (machines, pillars, beams, etc.) connected to the ground for safety reason or being grounded by installation (massive steel columns). The accumulated dust piles-up in the shape of electro-static fields.

It was observed that **a positive or negative charged pellets running in transparent plastic conduits were attracted by massive conductive materials connected to the ground (support beams, columns)**.

We found that it is a well-known practice in the electrostatic powder coating industry that no matter what polarity charge is used, the powder is attracted to the metal object connected to ground.

We observed the fact that the ground (Earth) potential, seemingly electrically neutral, acts as non-neutral, active with both polarities.

In "neutral" Earth is an abundance of energy of both polarities. How do we explain that a charge of any polarity (+ or -) is attracted by grounded body?

The explanation can be similar as the one we found in magnets that the vectors or "lines of force" (depicting density and direction of a field) of similar polarity are suppressed (bent away) by the repulsive force "stretching" a distance **d**.

Charges of opposite polarity are attracted at the closest distance. Fig. 2 shows example of combined fields between two neutrons in (too) close proximity.

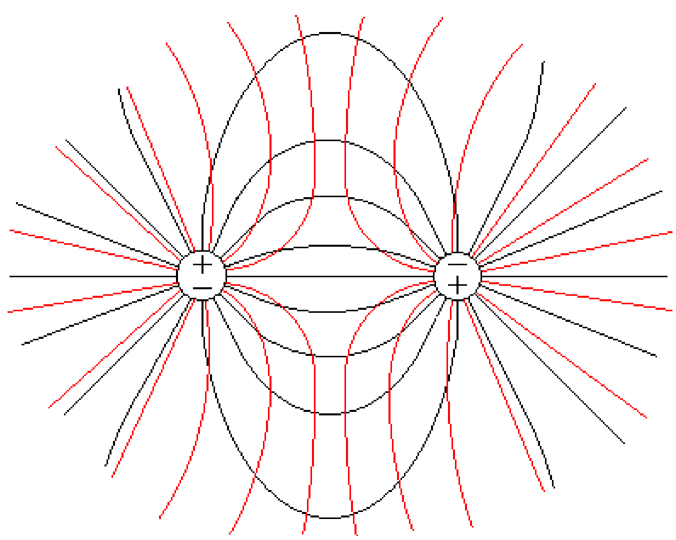

Fig. 2

Fields of electrical charges in an atom are not confined within the atom itself. We know that atoms of gas attract each other until stopped by the repulsive force of the electron shells. We also know that other fields of force do not confine electrostatic fields of force, although they can be shaped, directed and controlled.

INEQUALITY OF ATTRACTION AND REPULSION FORCES.

In today's physics, Coulomb's formula for **attraction** of two electrical charges is:

$$F_{12} = k\frac{Q_1 Q_2}{r^2} \qquad k = \frac{1}{4\pi\varepsilon_0}$$

This formula is automatically applied to repulsion.

Considering that electrostatic fields would behave in a similar manner as we found with magnets, Coulomb's law for attraction would not fit the same way for repulsion, due to the longer repulsion vectors, or a different density of the field.
Assuming that the described dissimilarity and difference in value of the attractive and repulsive forces in the totality of charges in a body favours attraction and is proportional to the energy - gravity ratio, we can propose that:
Between two bodies of mass appearing electrically neutral, the gravitational force can be a result of the total sum of electrical forces represented by an immediate difference of vectors or density of an attractive and repulsive fields of force, which difference would be related to the gravitational constant.

SUMMARY

Experimental tests show, that the attraction between magnets, always prevail over repulsion. This difference is getting smaller with the distance and therefore, **difficult to find**. If found, it was generally ignored as an anomaly of the test. Well, the prevalence of attraction appears not to be an anomaly. In that case, the Coulomb's Law for repulsion has to be modified.
The formula E = mc^2 is customary to manifest the enormous amount of energy in the body of matter. In the electrically neutral body it represent a multitude of attractive and repulsive fields. It took about a decade for this author to assume that those fields might differ in a similar manner as found between magnets.

This assumption led author to propose **gravity to be represented by the difference** between the **sum of attractive (*a*) forces** of two bodies of mass and the **sum of repulsive (*r*) forces** in the same bodies provided by the total energy of the bodies, in favor of attraction:

$$G = k_{\varepsilon}\frac{\sum Qm_{1a} \bullet \sum Qm_{2a}}{(d_{m_{1a}m_{2a}})^2} - \left\{ k_{\varepsilon}\frac{\sum Qm_{1r} \bullet \sum Qm_{2r}}{(d_{m_{1r}m_{2r}})^2} \right\}$$

Because the resulting difference represents gravity, the equation can be written as:

$$G = k_{\varepsilon}\frac{\sum Qm_1 \bullet \sum Qm_2}{(d_{m_1m_2})^2} - \left\{ (k_{\varepsilon} - \frac{g}{c^2})\frac{\sum Qm_1 \bullet \sum Qm_2}{(d_{m_1m_2})^2} \right\}$$

Where the $\left\{ (k_{\varepsilon} - \frac{g}{c^2})\frac{\sum Qm_1 \bullet \sum Qm_2}{(d_{m_1m_2})^2} \right\}$

would represent the **Coulomb law for repulsion.** In these equations, k_ϵ is $1/4\pi\epsilon_o$ and g is the universal gravitational constant (6.67259 x $10^{-11}m^3kg^{-1}s^{-2}$) The product of the sums leads to many terms involving the product of two masses. In each case, $d_{m_1m_2}$ is the distance between those two masses.

If our proposed theory of gravity is right, the new view, we hope, will bring us to more exact interpretations of the other observed facts and test results. It would, certainly, help to solve the mystery of the "non-polar" gravity.

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List of Captions:

Fig. 1
The graph of results of attraction and repulsion measured in 1-mm increments at the distance from 1 to 25 mm:

Fig. 2
Bodies charged by opposite polarities attract each other in the shortest distance lines.
The lines of repulsive force between bodies of a similar charge are bent away from the shortest distance.
The pattern has rotational symmetry about an axis passing through the two charges.

Fig. 3
A simple experiment showing a difference between attraction and repulsion - in favor of the attraction.

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