Brown Effect: The Experimental Proof

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Abstract

The article describes an experiment for detecting the Brown effect. The essence of the effect is that a capacitor under high voltage develops a force. The paper provides measurements and calculations related to the conducted experiment as well the explanation for the origin of the force.

1 Introduction

There are dozens of devices which are known to produce more energy than they consume. From a practical perspective, the Roschin-Godin converter is of particular interest [1]. The theoretical description of this device requires knowledge and understanding of physical effects it is based on. As it is shown in [2], one of such effects is the Brown effect. Despite long standing interest from researchers, there were no convincing proof of this effect to exist. This paper describes the experiment that unequivocally proves the existence of the Brown effect.

Thomas Toundsend Brown has declared the effect of charged capacitor to be moving until discharged. Brown has conducted series of experiments, but they were not recognized as convincing. Brown did not publish the results of his experiments in science periodicals. In 1952, the Brown's experiments were repeated at Glendal Plant of Bendix Aviation Corporation [3]. It was concluded that the effect appears due to "electric wind".

2 Experiments of Brown and Hecht

There were several experiments conducted to study the Brown effect.

1. In the first experiment done by Brown, two lead balls were suspended from ceiling on metal threads with certain distance between the balls. The metal threads were used as conductors. When the spheres were charged with the opposite charges by voltage of 125 kV, they were attracted to each other according to the laws of electrostatics. However, the negatively charged ball has deflected twice as much as the positively charged ball. This phenomenon revealed the effect in this experiment. If the spheres were connected by non-conducting rod, both balls have deflected towards the positively charged ball.

2. In his second experiment, Brown used a capacitor secured on a horizontal balance beam, which could rotate in the horizontal plane. When the capacitor was charged with high voltage, it created a force directed towards the positively charged plate. As a result, the balanced beam turned. While being charged, the capacitor was keeping the force of 0.25 N (the other parameters of the experiment were unknown). Normally, the force was directed towards positive plate. However, sometimes it was directed to the opposite direction. At certain times, the force was six times greater than normal. Brown believed that it depended on the positions of Sun and Moon.

3. His third experiment was related to flying saucers. The six-feet plexiglass balance beam was secured on a metal stand. The balance beam was able to freely rotate in horizontal plane.

The Brown's disks were installed on both ends of the balance beam. (The detailed description of the experiment setup is given in [3].) After supplying 40 kV DC voltage, the balance beam started to rotate.

4. In the fourth experiment, the force developed by the capacitor was measured on weights. In this experiment, the capacitor was made of 10,000 sheets of lead foil, 3" x 3" and 0.001" thin with 0.0008" thin sheets of cellulose acetate in between.

5. There was also an experiment conducted by Andreas Hecht [4]. In this experiment, two high-voltage capacitors made of $BaTiO_3$ ceramics were placed on a non-conducting board which was suspended on copper wire as a torsion balance. The supplied voltage was 5 kV. The effect was not observed.

3 The analysis of experiments of Brown and Hecht

Brown believed that he has discovered the effect which enables controlling gravity by electric field. This theoretical ground did not correspond to the physical nature of the effect and made him unable to come up with the correct experimental setup based on adequate theoretical ground.

As it is shown in [2], the density of force acting on a capacitor can be described by the following formula:

$$f = -qE \tag{1}$$

$f, N/m^3$ - the force acting on one unit of volume of a capacitor
$q, C/m^3$ – a constant
$E, V/m$ – field density in a capacitor

Inefficiency of Brown's experiments becomes obvious if we analyze them using this equation. With use of multiple layers, Brown tried to increase the force by increasing the capacitance. This intention is baseless. In any two neighboring layers, vectors of electrical field have opposite directions and the forces imposed by these layers compensate each other. That is why a one-layer capacitor should be used to observe Brown effect.

If the area of capacitor plates is S and the distance between the plates is h, then the force acting on the capacitor will be the following.

$$F = qShE \tag{2}$$

If a capacitor is charged to the potential difference of U, and dielectric permittivity between the plates is ε, then the electric field intensity in the capacitor will be the following.

$$E = \frac{U}{\varepsilon h} \tag{3}$$

Using this relation, we can define the force acting on a capacitor.

$$F = qSU \tag{4}$$

Equation (4) shows that the force developed by a capacitor does not depend on the distance between the plates. Therefore, to reduce the mass of a capacitor, the capacitor should be in form of a flat sheet. The thickness of the sheet is defined by the disruption voltage of the dielectric material it is made of. The mass of such sheet will be small enough.

The dielectric permittivity in equation (3) is in denominator. This fact imposes one more requirement for experimental apparatus: *the dielectric permittivity should be as small as possible.*

In the experiment with weights conducted by Brown, the mass of the capacitor was 10 kg, so the weight was about 100 N. Brown reported that the force developed by the capacitor was 0.25

N which is 0.25% of the capacitor weight. According to the rules of metrology, the measurement error of a measuring device should be not more than 1/3 of measured value. Therefore, Brown should have use weights with accuracy class 0.08. Most likely such weights did not exist at the time when Brown was conducting his experiments.

Because the force developed by a capacitor is quite small, the problem of its measurement is challenging. The small mass of a one-layer sheet allows us to resolve this problem.

To research the Brown effect, measurement of force developed by a capacitor should be taken on a torsion balance.

In another Brown's experiment (the one with flying saucers), a thin wire was used as one of the capacitor's plates. It is obvious that the area of the wire is small whereas the force is proportional to the area of plates according to equation (4). Ironically, in his experiments Brown did everything to suppress the effect he was trying to detect. However, this circumstance gives us a hope to detect the effect if the experimental setup is reasonably designed.

In the experiment done by Hecht, the sizes of the capacitors are unknown. We can only guess that he was using typical capacitor with diameter of 20 mm. The area of such capacitor is 3 cm^2. Brown's capacitor had the area of 78 cm^2. Only due to decrease in area, the capacitor in Hecht's experiment had force 25 less than in Brown's experiment.

A typical capacitor is made of titanium-barium ceramics. The capacitor ceramics CM-1 made of $(BaTiO_3)_{0.9} \cdot (BaZrO_3)_{0.075}$ has dielectric permittivity equal to 3000. The dielectric permittivity of cellulose acetate used by Brown is about 1000 less. This factor alone will decrease the electric intensity and therefore the force by factor 1000.

Brown was using voltage up to 150 kV. Hecht was using voltage 5 kV. Even if we assume that Brown was using voltage 25 kV then the force will be decreased by factor 5 only due to this reason.

Overall, the force that could be created in Hecht experiment would be 100-150 thousand times less than in Brown experiment. We can say that Hecht put much more effort to make the experiment unsuccessful. Such experiment cannot be considered as validating.

The experiment free from the deficiencies introduced by Brown and Hecht is described below.

4 The experiment for studying Brown effect

4.1 The experimental setup

The installation diagram is shown in Fig. 1. The sensing element (its design is described below) is suspended on a copper wire from a bracket made of polystyrene and secured on a capital wall. The upper end of the wire is soldered on a holder screwed on the bracket. High voltage corresponding to the positive pole is supplied to the holder through a high-voltage wire. This way positive voltage is supplied to the sensing element through the suspension wire.

A graduated cardboard ring (with a step equal to one degree) is glued to the board. For the convenience of measurement, the sensing element has a pointer made from a cord thread soaked with epoxy glue. The pointer is secured on a non-conducting part of the sensing element.

The sensing element consists of two capacitors which create torque when charged. The element is made of a sheet of metallized epoxy fiberglass. This way the capacitors are thin and light (in contrast to Brown's capacitors), and they have low dielectric permittivity (in contrast to Hecht's capacitors). The dielectric permittivity of epoxy fiberglass is equal to 5.4.

The design of the sensing element is shown in Fig. 2 and Fig. 3. Fig. 3a shows metallization of the face side of the sheet (face view). Fig. 3b shows metallization of the back side of the sheet (face view, metallization of the face side is not shown here, metallization of the back side is depicted by dashed line as non-visible).

The top clamp is soldered to connect two metallized areas on the face and the back sides. The bottom clamp connects the other two metallized areas on the face and the back sides. The top clamp is soldered to the bottom end of the suspension wire. The low clamp is soldered to the electrode which is a stainless-steel tube 30 mm long and having outer diameter 4 mm.

The lower end of the electrode is lowered into a 10 ml cylindrical brass vessel filled with a concentrated solution of sodium chloride. The positive voltage gets supplied through the suspension wire and the top clamp. The negative voltage gets supplied through the vessel, solution, electrode

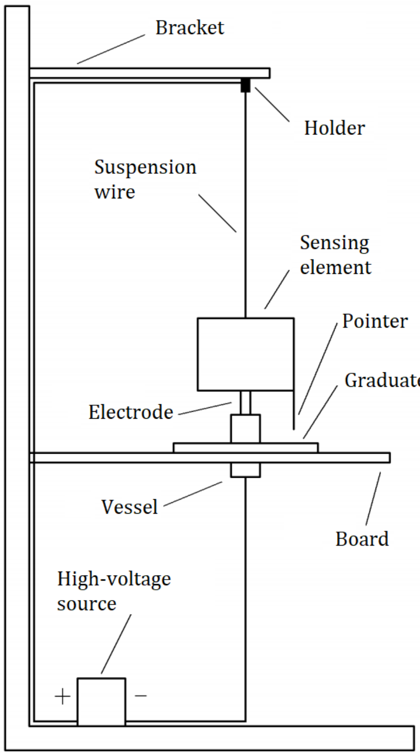

Figure 1: General view of the experimental setup

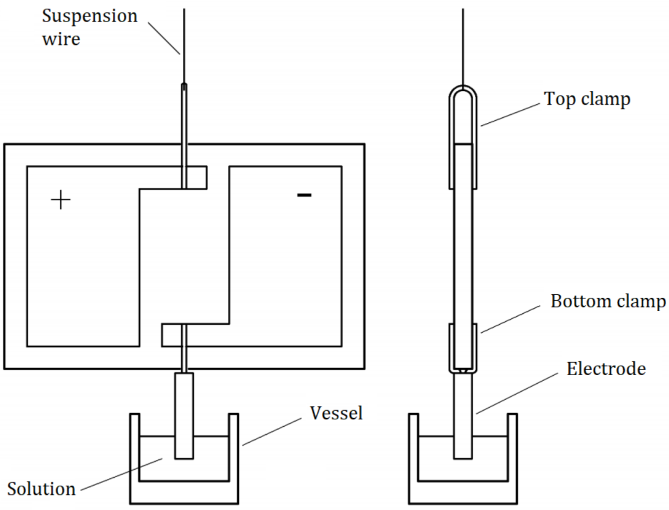

Figure 2: The design of the sensing element

and the bottom clamp. This way of connecting metallized areas forms two flat capacitors. The vectors of electric intensity of these capacitors have the opposite directions. Therefore, the forces acting on these capacitors also have the opposite directions and create a torque acting on the sheet of the sensing element. The metallized areas are etched in such way that the air distance between them is never less than 15 mm. This makes a breakdown by air impossible (the breakdown voltage for air is 30 kV/cm). The thickness of the sheet is 2.5 mm. This thickness is enough to avoid a breakdown through the sheet (the breakdown voltage for epoxy fiberglass is 10-16 kV/mm).

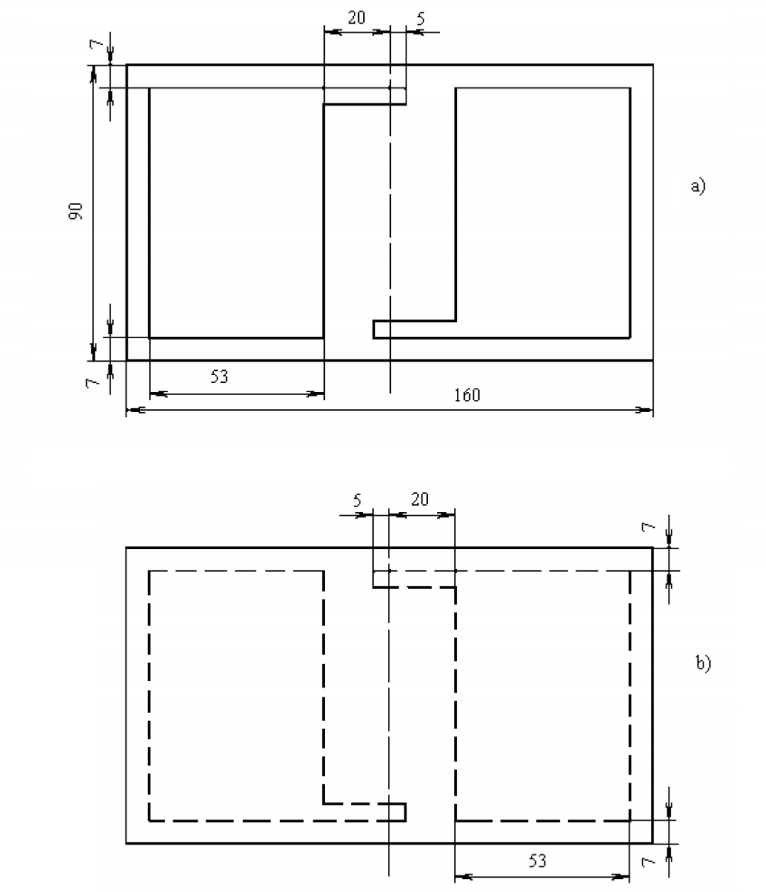

Figure 3: Metallization of the sensing element

The following list includes the parameters of the experimental setup and constants which are necessary for calculations.

Diameter of the suspension wire	d	$0.09\ mm$
Length of the suspension wire	L	$140\ mm$
Thickness of the fiberglass sheet	h	$2.5\ mm$
Width of the capacitor plate (metallized area)	a	$53\ mm$
Height of the capacitor plate (metallized area)	b	$76\ mm$
Arm of force	l	$46\ mm$
Voltage supplied to the capacitors	U	$20\ kV$
Dielectric permittivity	ε	5.4
Shear modulus for copper	G	$4.5 \cdot 10^{10}\ N/m^2$

4.2 The results of the experiment

According to formula (5) for the force density, the sensing element should rotate counterclockwise.

$$f = -qE \tag{5}$$

In this experiment, the sensing element rotates counterclockwise (if we look from the top view) at an angle of 50° immediately after voltage supply. Then the element goes into damped oscillation mode while the voltage is still supplied. The steady-state value of the angular deviation is 25° from the initial position.

Thus, the Brown effect is clearly detected.

According to the experimental data, it is possible to determine the specific (relative to the unit of plate area) force developed by the capacitor. The angle of rotation of the lower end of the suspension wire is determined by the following formula:

$$\varphi = \frac{ML}{C} \tag{6}$$

M - moment of force acting on the wire
L – length of the wire
C – torsional stiffness of the wire

The torsional stiffness of the wire with section radius r is equal to the following.

$$C = \frac{\pi r^4}{2} G \tag{7}$$

Here G is the material shear modulus, which is $4.5 \cdot 10^{10} N/m^2$ for copper (the material of the suspension wire). We can calculate torsional stiffness of the wire as the following.

$$C \approx 2.9 \cdot 10^{-7} Nm^2 \tag{8}$$

According to Fig.3, the arm of force for one capacitor is 47 mm. It is possible to find the force developed by one capacitor as the following.

$$F = \frac{C\varphi}{2Ll} \tag{9}$$

Substituting the numerical data, we get the following value.

$$F \approx 9.6 \cdot 10^{-6} N \tag{10}$$

The area of one capacitor plate is $4 \cdot 10^{-3}$ m^2 . Therefore, the force density is the following.

$$f = 2.4 \cdot 10^{-3} N/m^2 \tag{11}$$

4.3 Determining the constant

Using the experimental data, it is possible to calculate the value of constant q. The force acting on the capacitor from the aether side is defined by formula (12).

$$F = qwE \tag{12}$$

w - volume of the capacitor
E – electric field intensity

The electric field intensity is calculated using formula (13).

$$E = \frac{U}{\varepsilon h} \tag{13}$$

h – thickness of the capacitor sheet

In this case, the electric field intensity is equal to $2 \cdot 106\ V/m$. The volume of the capacitor plate is $w = 1 \cdot 10^{-5}\ m^3$. The value of the constant is the following.

$$q = 6.44 \cdot 10^{-7} C/m^3 \tag{14}$$

This value is quite small. Technically sufficient forces can be expected only for high values of electric field intensity.

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Translator Notes

This article was translated from Russian by Herman Holushko. The original article can be found at http://n-t.ru/tp/ns/eb.htm