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The Contribution of Geomagnetic Forces to the Lifting Force of Various Aircrafts: From Balloons and Airplanes to Flying Discs

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Abstract: The fact that Bernoulli's principle does not explain the lift of the aircraft is finally recognized. At the same time, it is recognized that the nature of the forces that create the lifting force of aircraft is still unknown, in any case – for the representatives of official science. Correspondingly, the unacceptability of this state of affairs arouses the desire and provides an opportunity to resume discussion on the nature of the forces that provide the ability to fly both aircraft and other flying objects, including unidentified. Therefore, the analysis of forces, both electromagnetic and mechanical, involved in the creation of the lifting force can be useful. So, it is shown here that the mechanical component of lifting force of various objects flying in the atmosphere proposed here may be relevant. Thus, due to the analysis conducted here, it is shown that the same forces are able to cause flights of such dissimilar objects as balloons, airplanes and various flying disks, including Searl’s mysterious disk. As a result, special attention is drawn here to the earth’s electromagnetism, whose participation in the creation of the lifting force of various aircraft is not even suspected. As an additional result, clear explanations of the effects of both Biefeld-Brown and Hutchinson effects can be offered. Be that as it may, the discussion offered here may be at least informative.

Keywords: Levitation, Balloon, Airplane, Aircraft, Lifting Force, Flying Disk, Antigravity, Montgolfier, Frisbee, Schauberger, Biefeld-Brown Effect, Searl

1. Introduction

The rise of aircraft lift has traditionally been explained on the basis of the "equal transit time" theory (or the "equal transit time principle"). This theory was based on the assumption that the path of air molecules above the wing of an aircraft is longer than below it. For this reason, in order to meet at the trailing edge of a wing, molecules passing over the wing must move faster than molecules moving under it. Then, according to the principle and Bernoulli's equation, the pressure of the air flow on the lower surface of the wing should be greater than the pressure of the air flow on its upper surface. This pressure difference creates the lift of the wing.

All this could be believed, but calculations showed that in order to create the lift required for the flight of a small Cessna aircraft, the distance that the air "must" travel over the wing must be about 50% greater than the distance that the air "must" travel under the wing. Thus, to obtain lift, the air speed above the wing "must" be 1.5 times the speed of the air under the wing. That is, unlike the air under the wing, the air above the wing must suddenly be accelerated by a force of unknown nature. Accordingly, this force must be reasonable enough to split the incident airflow into the top and bottom and selectively accelerate the top or slow the bottom (or both). In other words, this power must have the qualities of Maxwell's demon. In addition, according to the theory of "equal travel time", another force must act in the area of the flaps, the nature of which is also unknown, which selectively slows down the upper part of the air stream.

Given all the above, the analysis of the electromagnetic and mechanical forces involved in the lift of various flying objects, both artificial and natural, can be useful. Unfortunately, the opportunity to offer this analysis arose only after the official statement of Nancy Hall from Glenn Research Center (NASA), who stated the inappropriateness of both Bernoulli's principle and equation to explain the emergence of the lifting force of aircraft.

Whatever it is, let's discuss all this.

2. Discussion

2.1. Geomagnetic Force That Lifts Positively Charged Earth's Objects

When the Earth rotates daily, the Earth's atmosphere constantly crosses the horizontal lines of the geomagnetic field (Figure 1) [1–3].

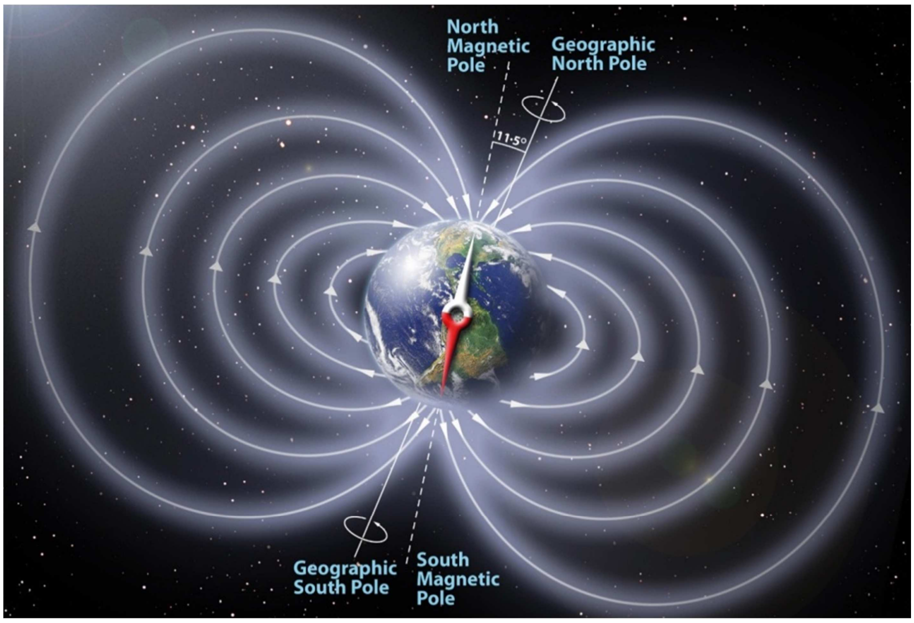

Figure 1. *Since the Earth has a daily rotation, all objects in its atmosphere constantly intersect the horizontal lines of force of the geomagnetic field. The Lorentz force arising in this case distributes the atmospheric charges in such a way that the positive charges move up, and the negative charges move down [2, 3].*

Therefore, in earth's atmosphere ever acts the up directed Lorentz force $\mathbf{F_L}$:

$$\mathbf{F_L} = q \bullet [v; \mathbf{B}],$$

where: q – electric charge present in the earth's atmosphere;

v – the velocity of the earth's atmosphere, the magnitude and direction of which is close to the velocity of the corresponding point on the earth's surface;

B – geomagnetic field induction [1 – 3].

The fact that the influence of this Lorentz force $\mathbf{F_L}$ on atmospheric charges is very noticeable was confirmed by calculations. Thus, the calculations shown that the magnitude of this Lorentz force $|\mathbf{F_L}|$ at the equator is:

$$|\mathbf{F_L}| = \pm e \bullet |v_e| \bullet \mu\mu_0|\mathbf{H}| = \pm 1.602 \bullet 10^{-19}\ A \bullet s \bullet 463\ m \bullet s^{-1} \bullet 1 \bullet 1.257 \bullet 10^{-6}\ V \bullet s \bullet A^{-1} \bullet m^{-1} \bullet 27.06\ A \bullet m^{-1} = \pm 2.5 \bullet 10^{-20}\ Kg \bullet m \bullet s^{-2} = \pm 2.5 \bullet 10^{-20}\ N \quad (1)$$

where: ±e (= ±1,602•10^{-19} A•s) – elementary electric charge (electron, positron, proton or hydroxyl-anion),

$|\mathbf{v_e}|$ (= 463 m•s^{-1}) – linear velocity of the earth's surface at the equator,

μ (= 1) – relative magnetic permeability of air,

μ_0 (= 1.257•10^{-6} V•s•A^{-1}•m^{-1}) – magnetic constant,

$|\mathbf{H}|$ (= 27.06 A•m^{-1}) – geomagnetic field intensity at the equator.

Correspondingly, knowledge of the discussed Lorentz force $\mathbf{F_L}$ allows to determine the acceleration of separate proton in the up-direction at the equator:

$$|\mathbf{a_{H+}}| = |\mathbf{F_L}|/m_{H+} = 2.5 \bullet 10^{-20}\ Kg \bullet m \bullet s^{-2}/1.67 \bullet 10^{-27}\ Kg = \sim 1.5 \bullet 10^{7}\ m \bullet s^{-2} \quad (2)$$

where: $|\mathbf{F_L}|$ (= 2.5•10^{-20} Kg•m•s^{-2}) – the specified Lorenz force $\mathbf{F_L}$ acting on a single proton at the equator,

m_{H+} (= 1.67•10^{-27} Kg) – proton mass.

Accordingly, the acceleration of a separate electron in the down-direction at the equator is:

$$|\mathbf{a_{e-}}| = |\mathbf{F_L}|/m_{e-} = 2.5 \bullet 10^{-20}\ Kg \bullet m \bullet s^{-2}/9.1 \bullet 10^{-31}\ Kg = 2.7 \bullet 10^{-10}\ m \bullet s^{-2} \quad (3)$$

where: $|\mathbf{F_L}|$ (= 2.5•10^{-20} Kg•m•s^{-2}) – the specified Lorenz force $\mathbf{F_L}$ acting on a single proton at the equator,

m_{e-} (= 9.1•10^{-31} Kg) – electron mass.

As well, the acceleration of a separate hydroxyl-anion in the down-direction at the equator:

$$|\mathbf{a_{HO-}}| = |\mathbf{F_L}|/m_{HO-} = 2.5\cdot10^{-20}\ \text{Kg}\cdot\text{m}\cdot\text{s}^{-2}/28.4\cdot10^{-27}\ \text{Kg} = \sim0.088\cdot10^{7}\ \text{m}\cdot\text{s}^{-2} = \sim8.8\cdot10^{5}\ \text{m}\cdot\text{s}^{-2} \quad (4)$$

where: $|\mathbf{F_L}|$ (= $2.5\cdot10^{-20}$ Kg•m•s^{-2}) – the specified Lorenz force $\mathbf{F_L}$ acting on a single proton at the equator,

m_{HO-} (=$28.4\cdot10^{-27}$ Kg) – the mass of the hydroxyl-anion.

Naturally, all the above results mean that elementary earth's charges have the possibility to quickly separate and move away from charges of the opposite sign, moving up or down. Since it is estimated that such separation should be rapid, naturally expect the presence of its manifestations in nature. In my opinion, both upward celestial proton fluxes, namely blue jets (Figure 2, above), elves and sprites, and downward celestial electron flows, namely usual lightings (Figure 2, below), live up to these expectations [2].

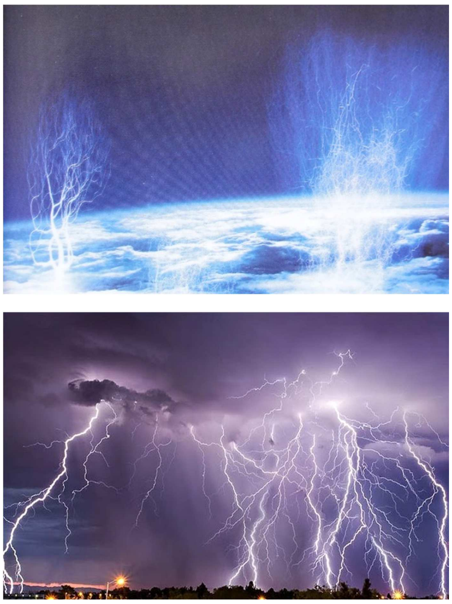

Figure 2. *Above: these are blue jets, which are mainly ascending flows of protons. Below: this is the usual thunderstorm lightning, which are mainly descending flows of electrons [2].*

In terms of the topic under discussion, it is also important that the intervention of this Lorentz force $\mathbf{F_L}$ is also manifested through the flows that exist in the clouds, both ascending positively charged and descending negatively charged (Figure 3) [2, 3].

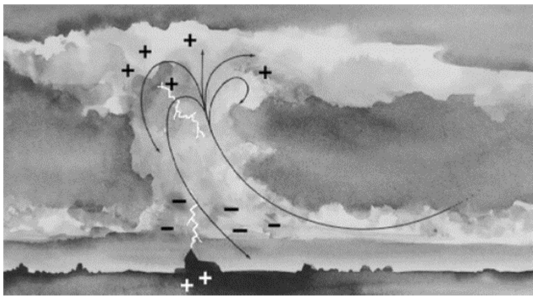

Figure 3. *Polarization of a typical cloud: the upper side of a typical cloud acquires a positive charge due to the ascending flows currying positive charges; the downer side of a typical cloud acquires a negative charge due to the descending flows currying negative charges [2, 3].*

At least, it is this Lorentz force $\mathbf{F_L}$ that manifests itself through the continually positive potential of the earth's ionosphere relative to the earth's surface, which is ~ $4\cdot10^5$ V [4].

Since this Lorentz force $\mathbf{F_L}$ is so significant, it is not surprising that it has finally attracted people's attention. Thus, the distributive action of this Lorentz force $\mathbf{F_L}$ on steam charges, as well as in the clouds (Figure 3), used by steam engine designers such as Thomas Sewer, Thomas Newcomer and James Watt [5]. After all, the lifting action of the same Lorentz force $\mathbf{F_L}$ on the steam, which always has a positive charge [6], attached the attention of Josepha-Michael Montgolfier, who was also able to use it for balloon flights, in fact – for levitation of balloons.

2.2. Flights of the Montgolfier Brothers

Thus, the ability of the discussed Lorentz force $\mathbf{F_L}$ to raise the steam (Figure 4), which is always positively charged [6], has finally found application.

It is worth recalling right now that this application became possible because Josepha-Michael Montgolfier saw an analogy between the steam rising both above the boiler and at the top of the clouds (Figure 3). Moreover, preferring steam to dry hot air, he intuitionally used the exclusive property of positively charged water to hydrate biopolymers [8] from which his balloons were made. Thus, it was this preference that allowed him to glue positively charged steam particles to the inner surfaces of the balloons, thus increasing the durations of their flights. Subsequently, both of these properties of rising steam formed in the flame of carbon-hydrogenate burners, were used to create the lifting force of hot-air balloons too (Figure 5) [7]. It is equally important to note that the Montgolfier brothers also believed that the rise of balloon with heated steam is caused by its "dynamic electrization" by heated steam, which causes electrostatic repulsion between the balloon and earth's surface.

Figure 4. *This is steam rising over a cup of coffee; it is quite obvious that steam forms up-directed currents of water particles whose density exceeds the density of ambient air. In particular, this means that Archimedes's force is unable to raise both free steam and trapped in a balloon, at least – independently [7].*

Figure 5. *Hot-air balloon takeoff. Gas burner flame is a kind of plasma [9, 10] whose charges, including hydrated protons, are distributed by the discussed Lorentz force* $\boldsymbol{F_L}$*, as well as in clouds (Figure 3). Rising hydrated protons transfer their own positive charge to the balloon to which they are glued, and negatively charged particles that form at the same time flow past the gondola almost freely [7].*

All this indicates that both had brilliant intuition, which can be compared with intuition of those scientists who determined the electrization of flying insects [11].

2.3. The Contribution of the Discussed Lorentz Force F_L to the Flights of Flying Insects

It should be additionally noted that the adoption of the discussed Lorentz force $\mathbf{F_L}$ clarifies the flight of insects; in particular heavy bumblebees, the positive electrization of the bodies of which necessarily precedes their takeoff [11]. Thus, the discussed Lorentz force $\mathbf{F_L}$ allows explaining such flights, which are completely impossible in terms of classical aerodynamics.

The fact that positive electrization of insects plays a noticeable role in their flight is well confirmed by insect gigantism in the Carboniferous epoch, when ~ 35% of the air consisted of oxygen [12], contact with which causes positive electrization of water and objects enriched with it [8, 13], including living. (Recall that the lower layers of the atmospheric air now contain ~ 21% oxygen [13].) This ratio suggests that the ability of giant, that is, rather heavy, insects to fly was due to their stronger positive electrization in combination with a higher intensity of the ancient geomagnetic field, in fact – the stronger Lorentz force F_L in the Carboniferous.

With this entire in mind, it is enough expecting that the Lorentz force F_L above-discussed will also be able to contribute to the creation of the lifting force of airplanes.

2.4. The Contribution of the Lorentz Force F_L to the Lifting Force of Airplanes

In particular, it is expected that the same Lorentz force $\mathbf{F_L}$ is involved in the creation of the lifting force of airplanes, the positive electrization of which is normal, at least in good weather (Figure 6) [14].

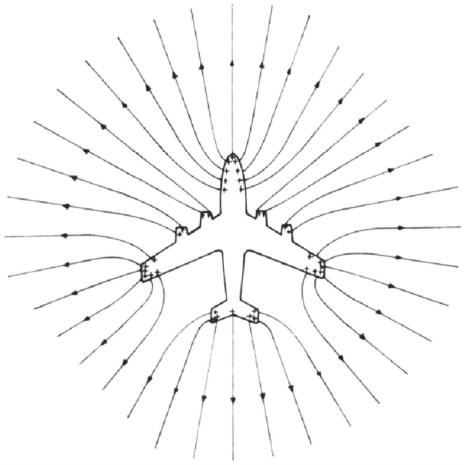

Figure 6. *Positive electrization of the aircraft is typical in good weather [14].*

It should be noted that at least three physical processes can cause positive electrization of the aircraft during its flight. First, the metal from which the aircraft is made can acquire a positive charge according to the rule of Kyon: upon contact of the two phases, the phase which has high dielectric permittivity receives a positive charge [13]. Since the dielectric permittivity of air is ~1 [13, 15], and dielectric permittivity typical of metals accepted as ∞ [15], the metal plane must acquire a positive charge. Second, a metal airplane can acquire a positive charge due to thermal emission of electrons [15] that is definitely happen, since the body of a flying plane is enough hot (Figure 7) [7].

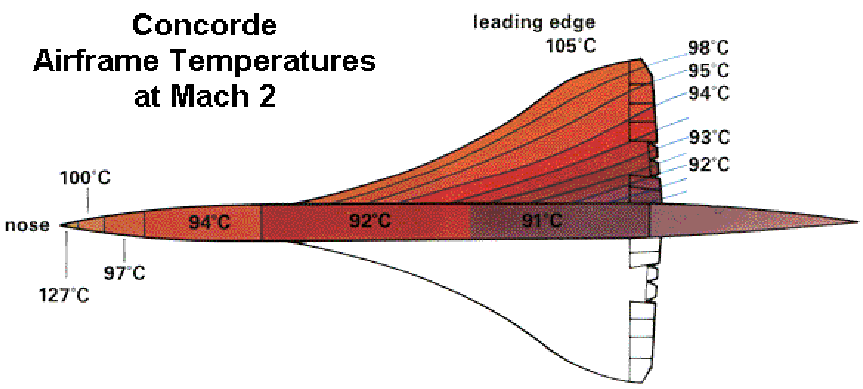

Figure 7. *The heating of the Concorde flying at a speed of ~2450 km per hour (Mach 2) near the earth's surface (~20 °C, ~1 atmosphere) [7].*

Third, the positive electrization of most aircrafts may be a manifestation of the exceptional electron donor properties of aluminium relative to the aquatic environment, in particular – moist air. (It should be noted that this property of aluminium allows it to be used as a cathode in electrolytic rectifiers or diodes [16].) Of course, the friction of aircraft bodies in the air contributes to the implementation of all the above processes. At least, the positive electrization of each metal aircraft can occur under the action of light, i.e. – be the result of a photo effect [15].

Thus, there are well-understood reasons to involve the same Lorentz force $\mathbf{F}_L$ in the creation of the lifting force of the airplanes. However, the contribution of positive electrization to aircraft lift is not limited to this. To understand what we are talking about, it is important to realize that positive electrization of the wings is accompanied by a simultaneous negative electrization of air currents. Thus, electrostatic interactions inevitably arise between positively charged wings (Figure 6) and contrary air flows. As a result of such interactions, air currents follow the curvature of the wings, thus creating the Coanda effect, which determines the required reflection of the oncoming air. In fact, the Coanda effect is directly involved in creating an upward impulse, which is a mechanical component of the lift of the aircraft.

2.5. Absolutely Elastic Ball Collision with a Wall

To be clear and consistent, let's first observe the collision of a perfectly elastic ball with a horizontal wall (Figure 8) [15, 17].

For convenience of reasoning in the aspect of the topic touched, let's imagine that the mass of the ball *m* is basically the mass of compressed air that fills the ball. As can be seen from Figure 8, the change in the direction of the pulse of such compressed air occurs under the action of a force $\mathbf{F}\uparrow = (m\boldsymbol{v}'\uparrow \cdot \cos\alpha' - m\boldsymbol{v}\downarrow \cdot \cos\alpha)/\Delta t = m \cdot \cos\alpha \cdot (\boldsymbol{v}'\uparrow - \boldsymbol{v}\downarrow)/\Delta t = m \cdot \boldsymbol{a}\uparrow \cdot \cos\alpha$. Since this force **F**↑ is directed upwards (Figure 8), the wall should have an equal in magnitude but downward force **F**↓ (as follows from the Newton's third law of mechanics) [15, 17].

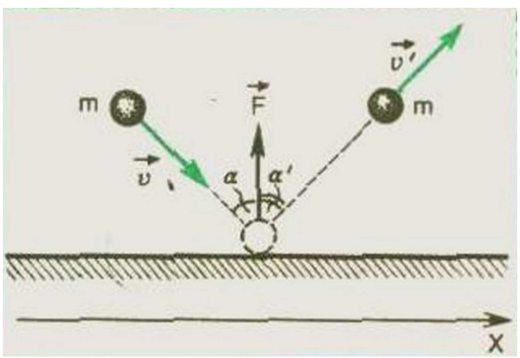

Figure 8. *Absolutely elastic collision of a ball with a wall is a special case of the law of conservation of momentum. In such a collision the ball is under the action of force **F**↑ = (m**v'**↑•cosα'–m**v**↓•cosα)/Δt, or **F**↑ = d**p**/dt; the wall simultaneously experiences the action of a force **F**↓ that has the same magnitude that **F**↑, but the opposite direction (**F**↑ = – **F**↓), as follows from the Newton's third law of mechanics [15, 17].*

So far, everything is clear and even obvious. Continuing in this vein, flip Figure 8 and imagine that the top side of the wall shown in the inverted figure is the bottom surface of the wing. In fact, this is all that is needed to understand the purely mechanical nature of the aircraft's lift (it is useful to assume that the mass of the ball is contained in compressed air). Obviously, such a lift **F**↑ arises with no alternative when air flows around a curved (asymmetric) wing (Figure 9), especially when the flaps are lowered.

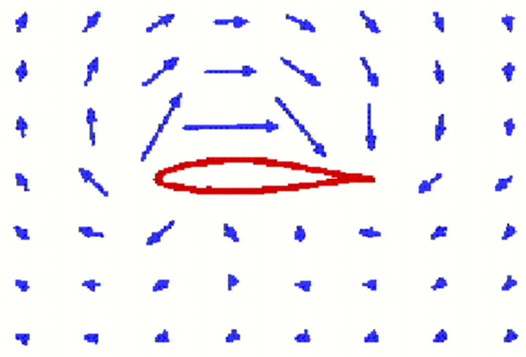

Figure 9. *Blue arrows show airflows flowing around an asymmetrical wing and, simultaneously, the above-mentioned Coanda effect.*

Moreover, based on Figure 8, we can conclude that the situation when $\alpha = \alpha' = 0$ and $\cos\alpha = \cos\alpha' = 1$ creates the maximum possible lift. Let's see how this situation is implemented in some cases.

2.6. Magnus Effect

Probably the Magnus effect (Figure 10) [15] is one of the most famous cases when α and α' can be taken as 0, and cosα and cosα' can be equated to 1, at least in the first approximation.

First, this approximation shows that the Magnus effect also arises from the reversal of the direction of the impulse of the air colliding with the rotating sphere, as shown above (Figure 8).

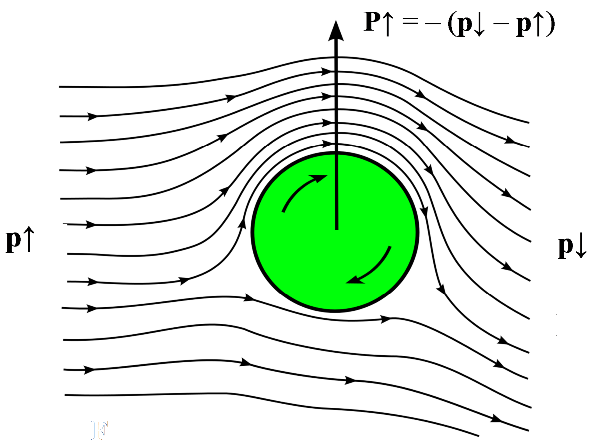

Figure 10. *An illustration of the Magnus effect: a rotating ball acquires momentum **P**↑, which is a mirror image of the momentum that the sphere transfers to the air flowing around it: **P**↓ = **p**↓ – **p**↑; simultaneously, the ball falls under the action of force **F**↑ = d**P**/dt [15].*

Secondly, it allows cyclocopters with rotating wings to be positioned as a type of air transport, the operating principle of which is quite clear. In addition, the proposed interpretation allows us to make sure that the Magnus effect can be explained without using the Bernoulli principle (or the Bernoulli equation, which was actually proposed by Leonard Euler).

At the same time, the fact that the positive electrization of both wings, including rotating, and rotating spheres, in fact – a Coanda effect, is extremely important for such a change in the impulse of the incoming air, and, therefore – for creation of the lifting force desirable. Let us keep using it all.

2.7. Schauberger's Flying Disc

In fact, the same air reflection, when α = α '→ 0, and, therefore, cosα = cosα' → 1, was used by Viktor Schauberger to create the lift of the flying disc (Figure 11) [18].

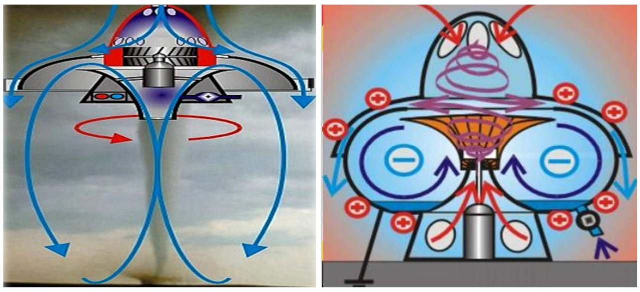

Figure 11. *Here are the diagrams illustrating the device and the principle of operation of the flying disc Schauberger. Left: blue arrows show air circulation, due to which the disk lift force arises; in fact, Schauberger extrapolated to this disk the processes occurring in a tornado. Right: According to Schauberger, positive disc electrization creates additional lift [18]. The lifting force of the Frisbee's plastic flying disk occurs in the same way.*

Apparently, the left fragment of Figure 11 can convince that the discussed lift forces are of a purely mechanical nature. That this is not quite the case was noted by Schauberger, who viewed the positive electrization of the disk he created as a factor that increases its lift. It seems quite obvious that the positive electrization of such disks is due to their friction with air flows (Figure 11, right).

It is likely that he learned that it was positive electrization that levitated UFOs that crashed in the German Alps in 1936: "The engine of his was a kind of spherical emitter. It produced electrons and positrons. The positrons are attracted to the top of the sphere and created the levitation" [19]. In any case, Viktor Schauberger's design contained a drain for electrons (Figure 11, right and below). Thus, the need for positive electrization of flying objects, at least – unusual, was previously recognized. It should be added that the spread of positive charges over the entire surface of the aircraft (Figure 6) determines its ability to maintain balance, as it is provided by the simultaneous action of the mentioned Lorentz force $\mathbf{F_L}$ on all parts of aircraft.

It is also worth noting that the principle used by Schauberger to create the lifting force of the flying disk was subsequently taken as the basis of the plastic flying disk (Frisbee). In this case, the lift is also due to a change in the impulse of the air flow, which rises in the center of the disk and moves to its periphery (under the action of centrifugal force [15, 17]), where it is directed downward due to the curved edge of the disk. Of course, positive electrization combined with the Coanda effect and the Lorentz force $\mathbf{F_L}$ discussed has also importance for Frisbee flights.

Thus, the Lorentz force F_L discussed constantly manifests its participation in the creation of total lifting force. To make this statement more convincing let us accept that only it can explain the flight of a plain with a symmetrical wing. Thus, this is the component of lifting force that makes aerobatics possible. Accordingly, it is this component that makes it possible to fly symmetrical disks.

2.8. Flights of Searl's Discs

So, now we are ready to discuss the nature of the force that lifts Searl's disks [20]. Recall first that all earth's objects that are in the northern hemisphere and rotate in a horizontal plane counterclockwise, when viewed from above, invariably cross the vertical component of the geomagnetic field and, therefore, get rid of negative charges and accumulate positive [3, 21]. (In fact, such a loss of negative charges, in the case of metals – electrons, can be presented as an extreme manifestation of the Hall effect [22].) Accordingly, the up directed Lorentz force $\mathbf{F_L}$ acts on all these positively charged objects, including Searl's levity disks; in the latter case, the extremely powerful Hall's effects were created by Searle using appropriately oriented magnets (Figure 12) [20].

It is worth recalling that the trunks of tornadoes that occur in the northern hemisphere also rotate counter clockwise when viewed from above, as well as UFOs observed there [3, 21].

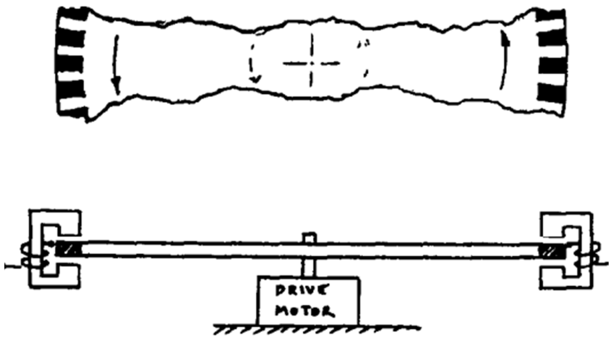

Figure 12. *This is what Searl's disk looks like, according to eyewitness [20].*

2.9. Positive Electrization Under the Hutchison and Biefeld-Brown Effects

First, we take into account the positive electrization of conductors with high-frequency currents due to the movement of electrons outside such conductors, in fact, the skin effect [23]. Consequently, such conductors quickly lose electrons, which are directed downwards by the repeatedly mentioned Lorentz force $\mathbf{F_L}$, and acquire both a positive charge and the ability of levitating (under the action of the same Lorentz force $\mathbf{F_L}$), which Hutchison convincingly demonstrated.

Also, the Biefeld-Brown effect observed for asymmetric air capacitors made of aluminium and charged to breakdown voltage [24, 25] can be explained by their positive electrization due to field emission of electrons (synonyms: cold, tunnel or auto emission of electrons) [23]. Hence the ability of levitating of such capacitors, which was demonstrated by Biefeld and Brown, seems to be expected (of course, if we do not forget about the same Lorentz force $\mathbf{F}_L$). Naturally, the use of aluminium, which led to the irreversibility of positive electrization of such capacitors, is fundamentally important for emergence of such an effect.

2.10. Positive Electrization of Helicopters

Obviously, most of these phenomena, which determine the positive electriziation of aircraft objects, and hence their ability to fly, are inherent in helicopters. For this reason, there is no need to remind them further when analyzing helicopter flights. It is only necessary to draw attention to the opposite direction of rotation of the carrying propeller of helicopters produced by different companies. In particular, it can be predicted that helicopters whose carrying propellers rotate counterclockwise (if you look from above) have a higher lift in the northern hemisphere and less in the south. Of course, it is also possible to predict that the flight properties of helicopters whose carrying propellers rotate clockwise (if also look from above) are mirror-inverted.

3. Conclusion

In terrestrial conditions, the lifting force of any flying objects, including plane, is mainly the result of the combined action of two forces.

The first of these forces is the upward Lorentz force $\mathbf{F}_L$ that directs upward all positively charged earth's objects, including flying; this Lorentz force $\mathbf{F}_L$ appears due to the fact that the Earth's surface and its atmosphere constantly crosses the horizontal lines of the geomagnetic field during the daily rotation of the Earth around its own axis. Of course, this force depends on the latitude and state of atmosphere, in particular – on the concentration and ratio of air ions of opposite sings. At the same time, it should be noted that in absence of such a force, the action of which is distributed through the aircraft, any transfer of masses inside it would create unsolvable problems with its balance.

The second of these forces appears due to the fact that the flying objects reflect the currents of air rushing at them. In fact, this force is characterized by an impulse that is negative with respect to the vector difference of the impulses of the air reflected by the flying object and strikes it. In fact, this force is a manifestation of Newton's third law of mechanics according to which the sum of the vectors of all interacting objects is constantly equal to zero.

Be that as it may, but the widespread opinion about the incomprehensibility of the nature of the forces that lift aircrafts, in particular airplanes [26], is too categorical.

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