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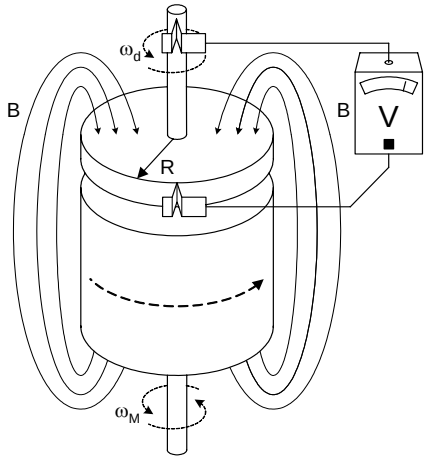
Abstract

The article has intention to show that M hypothesis is valid and that presently accepted one is not, i.e. that N hypothesis seriously violates Law of Momentum Conservation. It is shown on simply and comprehensive way using only basic physics laws easily understandable to everybody even with elementary physics knowledge.
M hypothesis claims that magnetic field is moveable and N hypothesis claims that magnetic field is static one.

N OR M HIPOTHESIS?

Over the 180 years the question has been scarring researchers. After initial experiments done by Faraday[1] showing that E field is not moveable in his famous experiment in which Faraday's wheel (also known as homopolar or unipolar generator) was used as dynamo machine to produce electricity.
The device is consisted from the circular permanent magnet rotating over its axe of symmetry and a disk above the magnet doing the same with the angular velocity different than the magnet below just as it is shown on the following picture:

Fig. 1



The device showed that induced potential depends on angular velocity ω_d of spinning disk regardless the angular velocity of permanent magnet ω_M as it is defined by the following formula:

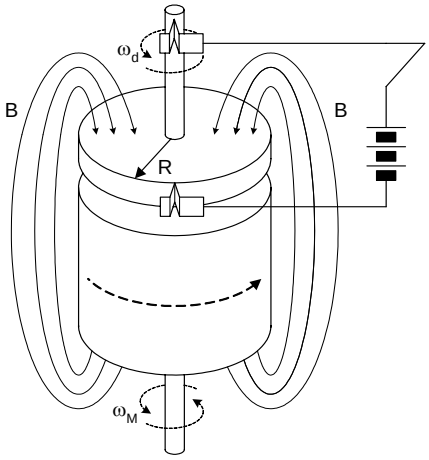
$$V = \int_0^r \vec{E} \cdot d\vec{\ell} = \int_0^r \left(\vec{v} \times \vec{B}\right) \cdot d\vec{\ell} = \int_0^r \left(\left(\vec{r} \times \vec{\omega}_d\right) \times \vec{B}\right) \cdot d\vec{\ell} = \frac{B \cdot r^2 \cdot \omega_d}{2} \qquad (1)$$

Vectors elimination can be done because $\vec{B} \perp \vec{\omega}$, $\vec{\omega} \perp \vec{r}$ and $\vec{\omega}$ is collinear to $\vec{B}$ as it is shown on the previous picture. $\vec{E}$ is replaced because $\vec{E} = \vec{v} \times \vec{B}$.
Due to equation (1) that is completely independent to angular velocity of magnetic source, i.e. of permanent magnet velocity, it was concluded by 19th century scientists that magnetic field is not moveable and that potential is

[1] Michael Faraday, 1798-1867

generating by the static magnetic field that intersect spinning disk. And this conviction is substratum of modern physics. This statements directly leads to Lorentz[2] transformation and consequently to Einstein[3] theory of relativity.
It really seems logically when we treat the device as generator, but situation becomes completely messy when the device is used as motor.
So, let we rearrange the experiment a bit: regarding the theorem of reversibility of DC machines/generators we can conclude that the mechanism will behave as a DC motor whenever we push the current trough it as it is shown on the following picture:

Fig. 2

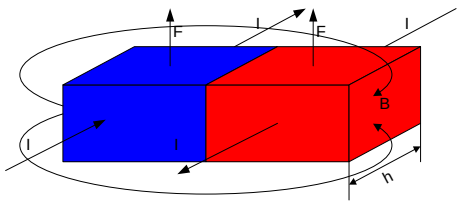


Let we analyze both N and M cases now:

N HYPOTHESIS

In case of N hypothesis current floats trough spinning disk and repeals on the static magnetic field, producing force and torque. I.e., force occurs on the path of current that floats between shaft and brash and it does not act to rotating magnet on any way. There is no stator and consequently Law of Angular Momentum Conservation is violated because there is no prop for the static magnetic field.
Also regarding the basic Newton[4] law of action and reaction we can conclude that the machine must have stator on which it will repeal.
Regarding Law of Angular Momentum Conservation the machine in case of N hypothesis could not act as motor because there is no prop for reactive forces.
This cartoon effect can be extended to the static magnet producing the force, i.e. linear momentum as it is shown on the following picture:

Fig. 3



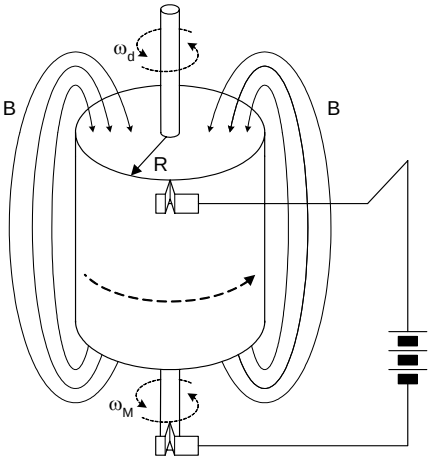
[2] Hendrik Antoon Lorentz, 1853 – 1928
[3] Albert Einstein, 1879 – 1955
[4] Isaac Newton, 1643 – 1727

Let we put a current to flow trough conductive permanent magnet in contra directions in opposite parts as it is shown on the above picture and let the magnet is being separated on two parts by thin insulator that prevents current to flow between poles of magnet. But, the construction can be extended to toroidal conductive permanent magnet, etc…
Such device would produce force repealing on itself and consequently this is not possible, isn't it?
The good thing with valid N hypothesis is that modern physics stay intact including Maxwell[5] equations, Lorentz Transformations and Einstein relativity. Only minor Law of Momentum Conservation should be rejected completely or partially, but the loss is negligible regarding rejection of Lorentz Transformations or even rejection of Theory of Relativity. Acceptance of both N hypothesis and Momentum Conservation Law is really tricky and nearly impossible.

M HYPOTHESIS

For M hypothesis we can suppose that magnetic field has velocity of conductor it floats trough. For better understanding of the device let we rearrange the device a bit: let a conductive permanent magnet rotate as it is shown on the following picture:

Fig. 4



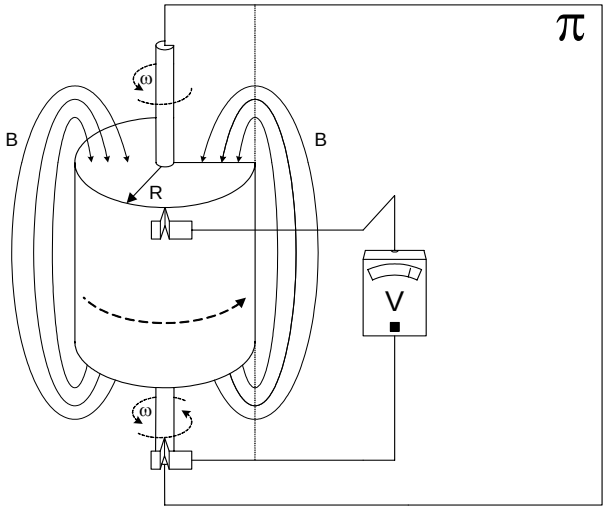
In the case, one side of force acts to a current floating between shaft and brash and other side of the force act to the rigid part of electric circuit outside the spinning magnet, i.e. to the wires and battery. Furthermore, end of force that acts to a part of closed electrical circuit in the rotating permanent magnet has equal magnitude and opposite direction than end of force acting to a rest of the circuit outside permanent magnet.
In the case of M hypothesis Law of Angular Momentum Conservation is not violated.
It is interesting that M hypothesis obeys to Faraday's law of induction:

$$V = -\frac{d\Phi}{dt} = -\frac{d}{dt}\int_S \vec{B}\cdot d\vec{S} \qquad (2)$$

[5] James C. Maxwell, 1831 – 1879. The equation was discovered at 1865.

It is a special case of the law where field $\vec{B}$ intensity is constant and surface $\vec{S}$ is changeable. For better understanding Lets we consider a homopolar generator consisted of permanent magnet rotating over its axe of symmetry intersected by the plane π as it is shown on the following picture:

Fig. 5



Let we imagine additional plane that is perpendicular to plane π and intersect it on doted line thus it is tangential to rotating permanent magnet. It is obvious that amount of $\vec{B}$ field are equal from both side of the additional plane supporting M hypothesis. Inner and outer part of electric circuit interacts with the same amount magnetic field and thus the force ends are perfectly equilibrated because the force is equal on its both ends.

The bad thing with M hypothesis is massive rearrangement of modern physics: Maxwell Equations, Pointing Theorem and Einstein Relativity are incompatible with the hypothesis because appropriate new formulas should contain velocity of $\vec{B}$ and $\vec{E}$ fields as suggested on http://www.andrijar.com/rwoteewdm/index.htm.

Hooper[6] showed by his coils that electric field $\vec{E}$ can be produced by two equal and oppositely placed permanent magnets moving in opposite direction although their B fields are annulated. It is possible due to their contra magnetic directions and contra velocities producing electric field in the same direction, i.e.:

$$\vec{E} = \vec{v} \times \vec{B} + \left(-\vec{v}\right) \times \left(-\vec{B}\right) = 2 \cdot \vec{v} \times \vec{B} \neq 0 \tag{3}$$

Although:

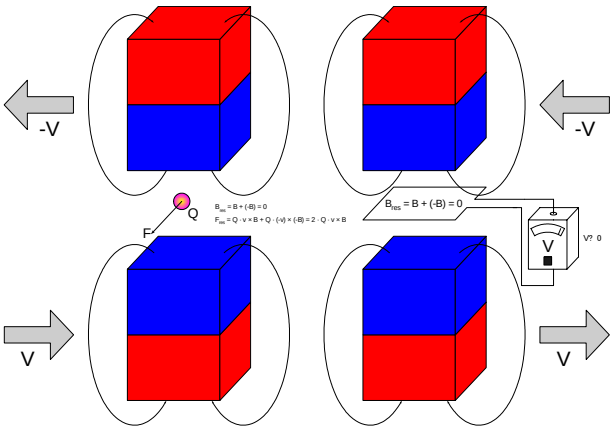
$$\vec{B} + \left(-\vec{B}\right) = 0 \tag{4}$$

The situation is very same with magnetic induction caused by current running trough electrically neutral conductor as all ordinary conductors are. There is

[6] W. J. Hooper, U.S. Pat 3610971 & U.S. Pat 3656013, patented in 1972

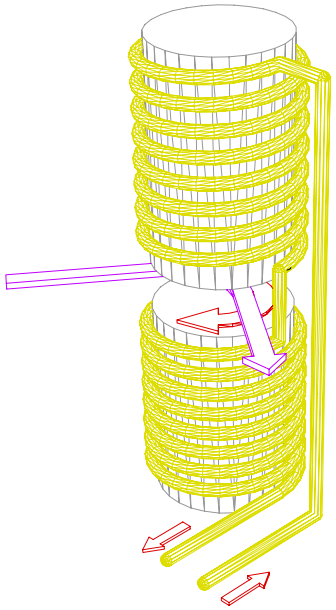
no outer electric field but certainly there is magnetic field in a solenoid. Present electromagnetic theory this situation exceeds dealing with currents directly avoiding usage of initial electric field.
The Hooper coils construction is shown on the following picture:

Fig. 6



Control charge Q will be affected by electric force induced by moving annulated electric field. Electric potential will be induced in the contour too although magnetic field is annulated and thus it is zero over the plane of interaction.
The following picture shows case of magnetic induction. The gap between two electromagnets does not contain electric field at all but it certainly contains magnetic field:

Fig. 7



There is no significant electric field in conductors especially in case of superconductive coils.
It is clear that charges flying trough the gap will decline in regard with rotation of electrons in solenoids. This clearly shows that electric and magnetic induction can exists regardless electric or magnetic field. If we imagine for a moment that electron is a bullet shouted in the water vertex, then the path of the bullet in the vertex and the path of the charge in the gap would be similar.

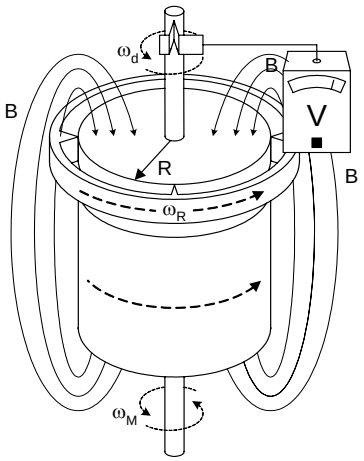
But, there is no full analogy because charge in rest does not interact with the electrons in solenoid. Interaction affects only moving charges.
Regarding above picture it is obvious that magnetic field is real vertex field caused by charge movement. Consequently we cannot talk about magnetic field alone without its origin, i.e. moving charges because it is summation of effects produced by all moving electrons in solenoid.

If M hypothesis is true, than Maxwell equations are just good approximation of something more essential.

EXPERIMENTAL VERIFICATION

The final experiment should be consisted of rotating conductive disk and measuring device and wires of outer electric circuit fixated to the disk or the measuring device with wires should be fixated on the ring supplied with the brushes spinning with its own angular velocity that is independent to angular velocity of disk and velocity of magnet:

Fig. 8



In case of valid M hypothesis voltage should be:

$$V = \frac{B \cdot r^2 \cdot (\omega_d - \omega_R)}{2} \tag{5}$$

In case of N hypothesis equation (1) should be still valid, i.e. induced potential should stay independent to angular velocity of outer electric circuit. Formula (5) contains stator velocity and thus it is not in collision with the Law of Angular Momentum Conservation.

CONCLUSION

The question whether the N or M hypothesis is valid one is essentially important for modern physics. Proper explanation of homopolar generator would immediately leads us to much more accurate electromagnetic formulas

that preserves Law of Action and Reaction, Law of Momentum Conservation and Law of Energy Conservation.
Rejection of N hypothesis would not cause complete rejection of Theory of relativity because it yields excellent experimental agreement probably due to big constant of light's speed.
In case of M hypothesis the concept of Electromagnetic Fields should be seriously revised.
The final answer should be given after series of carefully performed experiments with homopolar generator with disk of metal, graphite and semiconductor. It should be checked whether the machine in generator mode obeys to formula (1) or (5) or there is some other mechanism that produces electricity (maybe equation (2)?).
Finally, if N hypothesis is true – equation (1) is valid and (5) not, Energy Conservation Law is not real law and Star Drive is possible, everything else in Physics is O.K., otherwise everything must obey to Energy Conservation Law and most of modern physics knowledge is wrong excluding classical and quantum mechanics.

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