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ELECTRIC CURRENT IN ETHER FRIENDLY PHYSICS. Redaction 2020

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Key words:

Electric current, Ohm law, first law of Joule, electric potential, electric energy, electric resistance, resistivity, electrical conductivity, tension, current, electron, electronic cloud.

The Summary

Electric current in metallic conductor is not a current of electric charges or their porters – electrons; rather it is current of their kinetic energy. Electric current conductors e.g. resistors are provided with electronic gas that forms some kind of electronic cloud with electrons that while moving chaotically are trying to run with an equal velocities, thanks to which if in some place of the cloud they run for a while with a different velocity the next moment their velocities and their kinetic energies would get equal to the all others. Although their speeds are incomparable, electricity conduction has a long ago noticed analogy with conduction of heat, which is easy to understand if to compare masses of electrons and those of atoms or molecules of heat conducting objects. Electric energy is transported from electron to electron that practically do not change their place in the cloud, as well as heat is transported from molecule to molecule that also do not change their place in the object. Resistivity ρ may be imagined as a total mass of the cloud's electrons contained in a unitary volume of the conductor, while the difference in resistivity of different materials is a consequence that such different materials have different specific masses of their associated electronic clouds. Electric energy lost in a conductor during a unity of time may be determined as $H = M(v_1 - v_2)\frac{v_1+v_2}{2}$, where M is the electron cloud mass and v_1 and v_2 – are electron chaotic motion velocities at the beginning and the end of the conductor's cloud. Electric tension may be determined as $U = (v_1 - v_2)\rho l$, where $v_1 - v_2$ is electron chaotic motion velocity drop along the conductor's length l. It may also be represented as the drop along this length of the electric potential $U = p_1 - p_2 = v_1\rho l - v_2\rho l$. As results from the law of Ohm and the first law of Joule, the electric current through a resistor equals the product of the mean electron chaotic motion velocity of its electron cloud and its section area $I = A\frac{v_2+v_1}{2}$. Electric potential in any point of resistor's electron cloud equals the product of the electron chaotic motion velocity in this point and mass of the cloud divided by its section area $p = \frac{vM}{A}$.

Introduction

As declare modern science, and such views come from times of Andre-Marie Ampere (1775-1836) and Alessandro Volta (1745-1827) electric current is that of electric charges. In electric circuits such charges are most commonly transported by moving electrons of conductors. In electrolytes they can be transported by ions and in plasma by both ions and electrons.

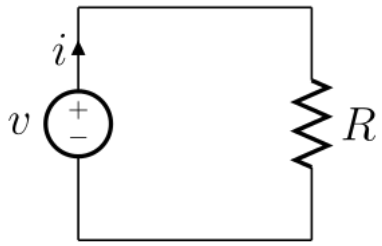
In my earlier articles [1,2] in conformity with the proved by the Ether friendly physics affirmation about fallibility of the accepted by modern science concept of electric charge expressed in the articles [3,4], as well as in the book [5] there was declared that electric current in metallic conductor is not that of electric charges or their porters – electrons, but rather – of their kinetic energy. Although in that article there were expressed other, as it was revealed later, mistaken assumptions, the expressed there opinion about the physical nature of electric current in metallic conductor keeps vigor and makes basis for the below expressed further considerations.

It bases itself on that the electric current conductors e.g. resistors contain electronic gas in form of an electronic cloud with electrons that while moving chaotically are trying to run with an equal velocity, thanks to which if in some place of the cloud they run for a while with a different velocity the next moment their velocities and their kinetic energies would get equal to the all others. Although related speeds are not comparable, electricity conduction has a long ago noticed analogy with conduction of heat, which is easy to understand if to compare masses of electrons and atoms or molecules of heat conducting objects. Electric energy is transported from electron to electron, the one and the other practically do not changing their place in the cloud, as well as heat is transported from molecule to molecule that also do not change their place in the object. As electron's electric potential there figures in our opinion and it will be proved later, the velocity of its chaotic motion, as well as by analogy heat potential of a molecule or its temperature would be the velocity of its thermal motion, which nature is still not quite clear [6]. In the same way as heat conduction motor is the temperature difference at the ends of a heat conducting object, the electric current motor is in our opinion the electric potentials difference at the terminals of resistor.

In spite of the electrical science counts several centuries understanding of physical nature of its main concepts remains distorted and physical nature of its units remains unclear.

Example of electric circuit

At a here imagined as the simplest example schema borrowed from Wikipedia is represented a closed electric circuit composed with a source of direct electric current and a resistor. As we can imagine the elements of the circuit especially resistor, contain an electronic cloud that has relatively to the drawing in its higher part potential p_1 and in its lawer part – potentialp_2.



In conformity to the accepted concept and in harmony with the mass conservation principle that might be better to be named matter conservation principle, the cloud electrons number has to remain unchanged, because it has neither source of their income nor possible losses, and this concerns not only the cloud as a whole but each of its fragments contained in the source of DC, resistor and connective conductors.

The potentials difference $p_1 - p_2$ is kept by the work continuously accomplished by the source of current and continuously wasted in the resistor while transforming itself to heat.

What can be determined from the law of Ohm and the first law of Joule

Modern views on electricity have as their base two widely known laws the connection between which, if to base oneself on those views on electric current that is now accepted by modern science is hardly understandable. These two laws are – the law of Ohm and the first law of Joule, or in other words – the law of Joule – Lenz.

The first of the above laws, if applied to the above schema would declare that the current$I$ that goes through resistor equals the tension$U$, that according to accepted views is a dropping of potential on the resistor's length, divided by its resistance$R$ in conformity to the formula

$$I = \frac{U}{R} \qquad (1),$$

that can be interpreted as

$$R = \frac{U}{I}$$

Electric resistance of a conductor is considered as its opposition to passage through it of electric current. As reports the Wikipedia the resistance of a conductor is determined by only two factors: by its material and its form. In a conductor from a certain material that for the simplicity of further calculations would be appropriate to consider as a segment of the length l and of the same cross-section area A the resistance will be proportional to the length and inversely proportional to the cross-section area that might be represented by formula

$$R = \rho\frac{l}{A} = \frac{l}{\sigma A} \qquad (3),$$

in which ρ is an inherent to the material resistivity that is a value inverse to the electro conductivityσ.

According to **the second of the above mentioned laws** (the first law of Joule) during flowing of electric current through a conductor therein each unit of time takes place generation of heat H according to formula

$$H = I^2R = UI \qquad (4).$$

According to our assumption resistivity may be imagined as full mass of cloud's electrons per unit of conductor's volume.

$$\rho = \frac{M}{lA}, \qquad (5).$$

Then the mass of the cloud can be represented as

$$M = \rho lA \qquad (6)$$

According to our assumption the electrons chaotic motion energy generated in the conductor per unit of time has to be

$$H = M\frac{\Delta v^2}{2} \qquad (7), \text{ where}$$

Δv is the electrons chaotic motion velocity alteration per unit of time. Given that $v_1 > v_2$, $\frac{\Delta v^2}{2}$ could be represented as $\frac{\Delta v^2}{2} = \frac{v_1^2 - v_2^2}{2} = (v_1 - v_2)\frac{v_1 + v_2}{2}$

Then

$$H = M(v_1 - v_2)\frac{v_1+v_2}{2} \quad (8).$$

And with consideration of (6)

$$H = \rho l A(v_1 - v_2)\frac{v_1+v_2}{2} \quad (9).$$

According to our assumptions

$$(v_1 - v_2)\rho l = U \quad (10),$$

$$A\frac{v_1+v_2}{2} = I \quad (11),$$

$$R = \frac{U}{I} = \frac{(v_1-v_2)2\rho l}{(v_1+v_2)A} = \rho\frac{l}{A}\frac{2(v_1-v_2)}{(v_1+v_2)} \quad (12)$$

Verification:

$$H = I^2R = (A\frac{v_1+v_2}{2})^2\rho\frac{l}{A}\frac{2(v_1-v_2)}{(v_1+v_2)} = \rho l A\,(v_1 - v_2)\frac{v_1+v_2}{2}.$$

Formula (10) allows to imagine electric tension as potential difference $U = (v_1 - v_2)\rho l = p_1 - p_2 = v_1\rho l - v_2\rho l = \frac{M}{A}v_1 - \frac{M}{A}v_2 = \frac{M}{A}\Delta v$, whereas each potential can be imagined as product of a respective velocity and mass of that part of the electron cloud that falls per unit area of conductor's section.

The here expressed considerations conduct to mind that the charge Q of the terminal of an electrostatic machine e.g. that of Van de Graaff can be represented as product of its surface area and its electric potential.

$$Q = A\frac{M}{A}v = Mv \quad (13),$$

And this may also refer to electric charge held on the surface of a capacitor's plate.

About alternating current

According to modern views alternating current is such one in which the electrons' stream direction is continuously changing. It means that if a moment it went from point A to point B, the next moment it would go from B to A. According to EFP, alternating electric current between connected points of a certain electric circuit is characteristic in that if at a moment electrons of the point A have the potential p_1 and electrons of the point B – the potential p_2, the next moment the electrons of the point A would have the potential p_2, and the electrons of the point B – the potential p_1.

CONCLUSIONS:

1) Electric current in metallic conductor is not a current of electric charges or their porters – electrons; rather it is current of their kinetic energy.
2) Electric current conductors e.g. resistors are provided with electronic gas that forms some kind of electronic cloud with electrons that while moving chaotically are trying to run with equal velocities, thanks to which if in some place of the cloud they run for a while with a different velocity the next moment their velocities and their kinetic energies would get equal to the all others.

3) Although their speeds are incomparable, electricity conduction has a long ago noticed analogy with conduction of heat, which is easy to understand if to compare masses of electrons and those of atoms or molecules of heat conducting objects. Electric energy is transported from electron to electron that practically do not change their place in the cloud, as well as heat is transported from molecule to molecule that also do not change their place in the object.
4) Resistivity ρ may be imagined as a total mass of the cloud's electrons contained in a unitary volume of the conductor, while the difference in resistivity of different materials is a consequence that such different materials have different specific masses of their associated electronic clouds.
5) Electric energy lost in a conductor during a unity of time may be determined as $H = M(v_1 - v_2)\frac{v_1+v_2}{2}$, where M is the electron cloud mass and v_1 and v_2 – are electron chaotic motion velocities at the beginning and the end of the conductor's cloud.
6) Electric tension may be determined as $U = (v_1 - v_2)\rho l$, where $v_1 - v_2$ is electron chaotic motion velocity drop along the conductor's length l. It may also be represented as the drop along this length of the electric potential $U = p_1 - p_2 = v_1\rho l - v_2\rho l$.
7) As results from the law of Ohm and the first law of Joule, the electric current through a resistor equals the product of the mean electron chaotic motion velocity of its electron cloud and its section area $I = A\frac{v_2+v_1}{2}$.
8) Electric potential in any point of resistor's electron cloud equals the product of the electron chaotic motion velocity in this point and mass of the cloud divided by its section area $p = \frac{vM}{A}$.

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