The mechanism of formation of static electricity from the atmosphere of our planet

Belashov Aleksey Nikolayevich

theoretical physicist, author of over 60 inventions, discoveries of five constants, four physical quantities, many mathematical formulas and laws of physics in the field of electrical and magnetic phenomena, electrostatics, electrical engineering, hydrodynamics, astronomy, astrophysics and stellar astronomy.

ORCID 0000-0002-4821-8004

Abstract. The article is devoted to the mechanism of the formation of static electricity, the mechanism of the formation of mobile electrons and the mechanism of the formation of thermoelectric currents between the material body and the air environment, where the gap uniting the environment of the interatomic space of the material body and the environment of the interatomic space of the air shell of our planet is located. This natural phenomenon is based on a varied force of interaction, different work and different power between different material bodies having different chemical and physical properties, having different densities and different volumes that come into contact with the atmosphere of our planet. This discovery allows a deeper understanding of the mechanism of the formation of static voltage, the mechanism of the formation of mobile electrons and the mechanism of the formation of thermoelectric currents in the air, consisting of various gases surrounding our planet.

Keywords: the mechanism of the formation of static electricity, the mechanism of the formation of mobile electrons, the mechanism of the formation of thermoelectric currents.

Humanity has always been interested in natural phenomena that have taken place on our planet. At that time, thinkers and scientists of antiquity could not give unambiguous answers to many of the mysteries of nature. For some reason, more modern scientists are now mainly remembered, but one must always remember about the thinkers and scientists of antiquity, of whom there were many, but they were already interested in questions that even modern scientists with a high level of accumulated knowledge cannot explain many natural phenomena, occurring in our macrocosm and microcosm.

Consider the mechanism of the formation of static electricity, between various materials having different densities that are in the air environment of our planet, which has in its composition most of the nitrogen atoms and oxygen atoms.

It should be emphasized that the surface of any material body has different roughness. If we process all materials interacting with the atmosphere of our planet up to the 14th accuracy class with an allowable roughness of no more than 0.010 microns, then the height of this deviation will be very different from the diameter of the electron itself, which has a radius of $2.8179403267 \cdot 10^{-15}$ m.

Fig.1

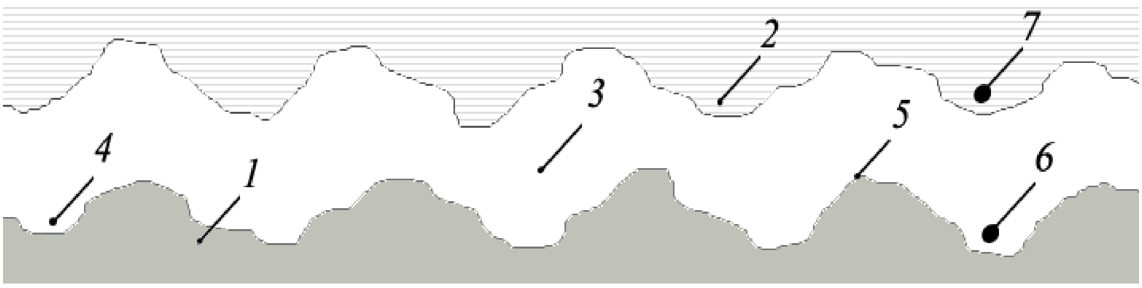

Fig. 1 shows a material body 1, which interacts with the air environment 2. Between the material body and the air environment there is a gap 3 that unites the environment of the interatomic space of the material body and the environment of the interatomic space of the air shell. Due to the roughness of the surface of the material body 1 having depressions 4 and protrusions 5, there is a different interaction between oxygen atoms and nitrogen atoms that make up our atmosphere. The environment of the interatomic space of the material body 1 consisting, for example, of copper and the environment of the interatomic space of the atmosphere of our planet 2 have different densities. Between the atoms of the air shell located in the gap 3, with the help of the forces of interaction between the copper conductor and various atoms of the air, oxygen atoms 6 and nitrogen atoms 7 are separated into separate electrons. Electrons of nitrogen atoms and oxygen atoms have different densities and different strengths of interaction with the interatomic space of the conductor 1 consisting of copper.

Knowing the density of the atmosphere of our planet, you can easily determine the mass of the atmosphere located in one cubic meter.

$$m = p \cdot V = 1.2041\ kg/m^3 \cdot 1\ m^3 = 1.2041\ kg$$

where:

m -the mass of the atmosphere of our planet. kg

p - the density of the atmosphere of our planet at 20 ºC = 1.2041 kg/m^3

V- the volume of our planet's atmosphere = 1 m^3.

Further, you can easily determine the force of interaction of the air shell, which has a volume of one cubic meter, to the surface of our planet, which has the acceleration of gravity of bodies in space = 9.80665 m/s^2.

$$F = m \cdot g = 1.2041\ kg \cdot 9.80665\ m/s^2 = 11.808187265\ H$$

where:

F - the force of interaction of 1 m^3 of the atmosphere of our planet. H

g - free fall acceleration of bodies in space = 9.80665 m/s^2

m - the mass of our planet's atmosphere, kg

However, it should be noted that the force of interaction of the atmosphere of our planet located in one cubic meter includes many different gases with different densities, where most of all nitrogen atoms and oxygen atoms are contained in the atmosphere of our planet.

From known sources, we know that at normal temperature, humidity and atmospheric pressure, the density of the main gases in our atmosphere is:

P_1 - nitrogen density = 1.1233 kg/m^3

P_2 - oxygen density = 1.42987 kg/m^3

P_3 - other components of the composition of the atmosphere are 0.97 %.

Состав атмосферы

Газ		Содержание в сухом воздухе, %
N_2	Азот	78,08
O_2	Кислород	20,95
Ar	Аргон	0,93
CO_2	Углекислый газ	0,03
Ne	Неон	0,0018
He	Гелий	0,0005
Kr	Криптон	0,0001
H_2	Водород	0,00005
Xe	Ксенон	0,000009

It is possible to check the strength of the interaction of the atmosphere of our planet, which is located in one cubic meter, which includes different percentages of the main components consisting of nitrogen gas and oxygen gas, according to a new law open and published in the scientific and practical journal "Higher School" № 6 for 2021.

The force of interaction of the investigated volume of a gas mixture consisting of many different atoms or molecules placed in one volume is equal to the sum of many products of the density of each atom or each molecule, the acceleration of free fall of bodies in space, the investigated volume of the mixture, and their percentage in a given volume.

Moreover, the sum of all the various investigated atoms or molecules of the investigated volume of the gas mixture should be one hundred percent.

$$F = (p_1 \cdot g \cdot V \cdot \%) + (p_2 \cdot g \cdot V \cdot \%) + (p_3 \cdot g \cdot V \cdot \%) =$$

$$= \left(\frac{кг}{м^3} \cdot \frac{м^3}{} \cdot \frac{м}{с^2} \cdot \% \right) + \left(\frac{кг}{м^3} \cdot \frac{м^3}{} \cdot \frac{м}{с^2} \cdot \% \right) + \left(\frac{кг}{м^3} \cdot \frac{м^3}{} \cdot \frac{м}{с^2} \cdot \% \right) = H$$

where:

F - the force of interaction of the investigated volume of the gas mixture, H

P_1 - the density of the first atom entering the volume of the test gas, kg/m^3

P_2 - density of the second atom entering the volume of the studied gas, kg/m^3

P_3 - density of a molecule entering the volume of the gas under study, kg/m^3

g - acceleration of gravity of the medium where the gas is located, m/s^2

% - the percentage of atoms or molecules included in this volume of gas,

V- investigated volume of gas mixture, m^3.

For example, let us determine the force of interaction of the air shell of our planet at which we will proceed from the fact that the density of air on our planet at 20ºC, normal pressure and normal humidity will be 1.204 kg/m^3, which is located at sea level with the acceleration of gravity of bodies in space = 9.80665 m/s^2.

$$F = (p \cdot g \cdot V \cdot \%) = \left(\frac{кг}{м^3} \cdot \frac{м^3}{} \cdot \frac{м}{с^2} \cdot \% \right) = H$$

$$F = 1.2041 \text{ kg/m}^3 \cdot 9.80665 \text{ m/s}^2 \cdot 1 \text{ m}^3 \cdot 100\ \% = 11.808187265 \text{ H}$$

where:

F - the force of interaction of the volume of the air gas mixture. H

P - the density of the air gas mixture of our planet = 1.2041 kg/m^3

V- investigated volume of the gas mixture of our planet = 1m^3

g - acceleration of gravity of the medium where the gas is located = 9.80665 m/s^2

% - the content of atoms and molecules included in the volume of air = 100 %.

For example, according to the new law, we will determine the strength of the interaction between the nitrogen atoms of the same name that make up the atmosphere of our planet.

$$F = (p \cdot g \cdot V \cdot \%) = \left(\frac{кг}{м^3} \cdot \frac{м^3}{} \cdot \frac{м}{c^2} \cdot \% \right) = H$$

F = 1.1233 kg/m^3 · 9.80665 m/s^2 · 1 m^3 · 78.08 % = 8.601144405056 H

where:

F - the force of interaction between electrons of the same nitrogen atoms. H

P_1 - nitrogen gas density at 25 ºC = 1.1233 kg/m^3

g - acceleration of free fall of the medium at a given height = 9.80665 m/s^2

% - percentage of nitrogen in the air = 78.08 %.

For example, according to the new law, we will determine the strength of the interaction between the oxygen atoms of the same name that make up the atmosphere of our planet.

$$F = (p \cdot g \cdot V \cdot \%) = \left(\frac{кг}{м^3} \cdot \frac{м^3}{} \cdot \frac{м}{c^2} \cdot \% \right) = H$$

F = 1.42987 kg/m^3 · 9.80665 m/s^2 · 1 m^3 · 20.95 % = 2.93765815613725 H

where:

F - the force of interaction between the electrons of an oxygen atom. H

P_2 - oxygen gas density at 25 ºC = 1.42987 kg/m^3

g - acceleration of free fall of the medium at a given height = 9.80665 m/s^2

% - oxygen percentage in air = 20.95 %.

From the calculations performed, it follows that the force of interaction between atoms and molecules of the atmosphere of our planet = 11.80818 H. So if the air flow of the gaseous mixture moves one meter, then we get the work of the air flow. If this work is performed per unit of time, then we will get the power generated by the air flow of the gaseous mixture at a certain height from the sea level, since the movement of the air flows of the gaseous mixture at different heights is different.

However, we are interested in the strength of the interaction of the electrons of each nitrogen atom and the electrons of each oxygen atom with any material body, such as copper.

For example, according to the new law of the open and published in the scientific and practical journal "High school" № 3 for 2021, we will determine the strength of the interaction between the electrons of the nitrogen atom and the electrons of the oxygen atom that make up the atmosphere of our planet.

$$F = p \cdot (\lambda \cdot n_a) \cdot (\lambda \cdot n_к) = \frac{кг}{м^3} \cdot \left(\frac{м^2}{с} \cdot шт \right) \cdot \left(\frac{м^2}{с} \cdot шт \right) = H$$

F = 1.2041 kg/m^3 · (0.000019 m^2/s · 5) · (0.000019 m^2/s · 6) = 1.30404 · 10^{-8} H

where:

F - force of interaction between nitrogen atoms and oxygen atoms, H

P - the density of the interatomic space of air at 20 ºC = 1.2041 kg/m^3

λ - thermal diffusivity of electrons in air at 20 ºC = 0.000019 m^2/s

n_a - the number of electrons in the outer row of the nitrogen atom = 5 pcs.

n_k - the number of electrons in the outer row of an oxygen atom = 6 pcs.

For example, according to the new law, we will determine the strength of the interaction between the electrons of the atom of the copper conductor and the electrons of the nitrogen atom that make up the atmosphere of our planet.

$$F = p \cdot (\lambda \cdot n_м) \cdot (\lambda \cdot n_a) = H$$

F = 1.2041 kg/m^3 · (0.0001125 m^2/s · 1) · (0.02775 m^2/s · 5) = 1.87952484 · 10^{-5} H

where:

F - force of interaction between copper and nitrogen atoms, H

P - the density of the interatomic space of air at 20 ºC = 1.2041 kg/m^3

λ - thermal diffusivity of copper electrons at 20 ºC = 0.0001125 m^2/s

λ - thermal diffusivity of nitrogen electrons at 20 ºC = 0.02775 m^2/s

n_m - the number of electrons in the outer row of a copper atom = 1 pcs.

n_a - the number of electrons in the outer row of the nitrogen atom = 5 pcs.

For example, according to the new law, we will determine the strength of the interaction between the electrons of the atom of the copper conductor and the electrons of the oxygen atom that make up the atmosphere of our planet.

$$F = p \cdot (\lambda \cdot n_{м}) \cdot (\lambda \cdot n_{к}) = H$$

F = 1.2041 kg/m^3 · (0.0001125 m^2/s · 1) · (0.02845 m^2/s · 6) = 2.31232353 · 10^{-5} H

where:

F - the force of interaction between copper and oxygen atoms, H

P - the density of the interatomic space of air at 20 ºC = 1.2041 kg/m^3

λ - thermal diffusivity of copper electrons at 20 ºC = 0.0001125 m^2/s

λ - thermal diffusivity of oxygen electrons at 20 ºC = 0.02845 m^2/s

n_m - the number of electrons in the outer row of a copper atom = 1 pcs.

n_k - the number of electrons in the outer row of an oxygen atom = 6 pcs.

From the calculations performed, it can be seen that the electrons of the copper atom have a greater force of interaction with the electrons of the oxygen atom than with the electrons of the nitrogen atom that is part of the atmosphere of our planet.

The force of interaction in the gap 3 between copper atoms and oxygen atoms creates a tension that leads to the separation of oxygen atoms into separate electrons, causing them to electrify and create electrical charges. If the movement of separated electrons released from oxygen atoms does not pass through the conductor, then this natural phenomenon can be called the mechanism of formation of static electricity.

The force of interaction in the gap 3 between the material body and the atoms of the air environment is a physical quantity that characterizes the action of bodies on each other and is a measure of this action, including:

- force of gravitational attraction and ionization,

- atomic, magnetic and electromagnetic forces,

- force of speed of movement and direction of movement,

- force of gravity, inertia, friction, elasticity and deformation,
- external, internal, contact or non-contact forces and so on...

Let us consider the mechanism of the formation of an electric current, between different materials having different densities in the atmosphere of our planet, which has in its composition the majority of nitrogen atoms and oxygen atoms.

If the movement of electrons released from oxygen atoms pass through a conductor, then this natural phenomenon can be called the mechanism of formation of mobile electrons and, depending on their number, these electrons do a certain job, which can be determined by the new Belashov's law.

A new law determining the strength of the interaction between mobile electrons and stationary atoms of a conductor, semiconductor or dielectric was discovered and published in the scientific and analytical journal "Actual problems of modern science" № 2 for 2021, which was formulated as follows:

The force of interaction between mobile electrons and stationary nuclear-free atoms of a conductor is equal to the product of the mass of a mobile electron by the speed of movement of mobile electrons along the conductor, by the acceleration of free fall of bodies in the space of moving mobile electrons by the number of mobile electrons, the diameter of the conductor, the length of the conductor and is inversely proportional to the diameter of the mobile electrons by thermal diffusivity of conductor electrons.

$$F = \frac{m \cdot v \cdot g \cdot n \cdot d_{п} \cdot L_{п}}{d_{э} \cdot \lambda} = \frac{кг}{} \cdot \frac{м}{с} \cdot \frac{м}{с^2} \cdot \frac{шт}{} \cdot \frac{м}{} \cdot \frac{м}{} \cdot \frac{}{м} \cdot \frac{с}{м^2} = Н$$

where:

F - force of interaction between mobile electrons and a conductor, H

v - the speed of electric charges moving along the conductor, m/s

g - acceleration of gravity of the medium where electrons move, m/s^2

λ - thermal diffusivity of conductor electrons at 25 ºC, m^2/s

d e - diameter of a mobile electron, m

n - the number of mobile electrons, pcs.

m - moving electron mass , kg

d_p - conductor diameter, m

L_p - conductor length, m

Let us consider the mechanism of formation of thermoelectric current, between various materials having different densities of the interatomic space of the conductor, which are in the air environment of our planet. For example, take two conductors, one of which is platinum and the other conductor is copper, which are connected in series.

For example, let us determine the strength of the interaction between the electrons of the third row copper atom having eighteen electrons and one electron of the fourth row copper atom at different temperatures.

$$F = p \cdot (\lambda \cdot n_{\text{B}}) \cdot (\lambda \cdot n_{\text{H}}) = H$$

$$F_{0\,^{\circ}C} = 8930 \text{ kg/m}^3 \cdot (0.00011250 \text{ m}^2\text{/s} \cdot 1) \cdot (0.00011250 \text{ m}^2\text{/s} \cdot 18) = 0.002034365625 \text{ H}$$

$$F_{500\,^{\circ}C} = 8930 \text{ kg/m}^3 \cdot (0.00009667 \text{ m}^2\text{/s} \cdot 1) \cdot (0.00009667 \text{ m}^2\text{/s} \cdot 18) = 0.001502129589786 \text{ H}$$

where:

F- the force of interaction between the electrons of a copper atom, H

p - the density of the medium of the interatomic space of copper = 8930 kg/m^3

λ - thermal diffusivity of copper at 0 ºC = 0.00011250 m^2/s

λ - thermal diffusivity of copper at 500 ºC = 0.00009667 m^2/s

n_v - the number of electrons of the third row of copper = 18 pcs.

n_n - the number of electrons of the fourth row of copper = 1 pcs.

Let us determine the power between electrons and copper atoms at 0 ºC and 500 ºC.

$$P_{0\,^{\circ}C} = 0.002034365625 \text{ H} \cdot 1 \text{ m} \cdot 1 \text{ c} = 0.002034365625 \text{ W}$$

$$P_{500\,^{\circ}C} = 0.001502129589786 \text{ H} \cdot 1 \text{ m} \cdot 1 \text{ c} = 0.001502129589786 \text{ W}$$

where:

$F_{0\,°C}$ - the force of interaction between electrons of copper atoms at 0 ºC = 0.002034365625 H

$F_{500\,°C}$ - the force of interaction between electrons of copper atoms at 500 ºC = 0.001502129589786 H

L - conductor length = 1 m

t – time = 1 s.

It should be emphasized that with an increase in the temperature of a conductor made of copper wire, its thermal diffusivity, the force of interaction with electrons of oxygen atoms and the power decreases.

For example, let us determine the strength of the interaction between the electrons of the platinum atom of the fifth row having seventeen electrons and one electron of the platinum atom of the sixth row at different temperatures.

$$F = p \cdot (\lambda \cdot n_{В}) \cdot (\lambda \cdot n_{Н}) = H$$

$$F_{0\,°C} = 21500\ kg/m^3 \cdot (0.00002472\ m^2/s \cdot 1) \cdot (0.00002472\ m^2/s \cdot 17) = 0.0002233491552\ H$$

$$F_{500\,°C} = 21500\ kg/m^3 \cdot (0.00002561\ m^2/s \cdot 1) \cdot (0.00002561\ m^2/s \cdot 17) = 0.00023972125255\ H$$

where:

F- the force of interaction between the electrons of the platinum atom,H

p - density of the medium of the interatomic space of platinum = 21500 kg/m^3

λ - thermal diffusivity of platinum at 0 ºC = 0.00002472 m^2/s

λ - thermal diffusivity of platinum at 500 ºC = 0.00002561 m^2/s

n_V - number of electrons of the fifth row of platinum = 17 pcs.

n_n - the number of electrons in the sixth row of platinum = 1 pcs.

Let us determine the power between platinum atoms at 0 ºC and 500 ºC.

$$P_{0\,°C} = 0.0002233491552\ H \cdot 1\ m \cdot 1\ s = 0.0002233491552\ W$$

$$P_{500\,°C} = 0.00023972125255\ H \cdot 1\ m \cdot 1\ s = 0.00023972125255\ W$$

where:

$F_{0\,^{o}C}$ - the force of interaction between electrons of platinum atoms

at 0 ºC = 0.0002233491552 H

$F_{500\,^{o}C}$ - force of interaction between electrons of platinum atoms

at 500 ºC = 0.00023972125255 H

L - conductor length = 1 m

t – time = 1 s

It should be emphasized that with an increase in the temperature of a conductor made of platinum wire, its thermal diffusivity, the force of interaction with electrons of oxygen atoms and the power increases.

Let us determine the difference in power with increasing temperature between the cold and hot junction of a thermocouple consisting of a copper conductor and a platinum conductor at different temperatures.

$P_{0\,^{o}C}$ = 0.002034365625 W – 0.0002233491552 W = 0.0018110164698 W

$P_{500\,^{o}C}$ = 0.00150212958978 W – 0.0002397212525 W = 0.001262408337236 W

where:

$P_{0\,^{o}C}$ - the power between the electrons of the atoms of a copper conductor

at 0 ºC = 0.002034365625 W

$P_{0\,^{o}C}$ - the power between electrons of platinum conductor atoms

at 0 ºC = 0.0002233491552 W

$P_{500\,^{o}C}$ - the power between the electrons of the atoms of a copper conductor

at 500 ºC = 0.001502129589786 W

$P_{500\,^{o}C}$ - the power between electrons of platinum conductor atoms

at 500 ºC = 0.00023972125255 W.

After the calculations made, it can be concluded that when the temperature changes inside the copper and platinum conductor, a potential difference and a different number of electrons interacting with these conductors arise, where in old electronic theories it is said about the positive charge and negative charge of the conductors.

It should be emphasized that in fact both conductors are charged with the same electrons released from oxygen atoms or nitrogen atoms of our atmosphere. It turns out that in one conductor the number of electrons released from the atmosphere of our planet associated with the conductor appears significantly more than in another conductor, which depends on many parameters and chemical properties of the interatomic space of one and the second conductor. This circumstance forces the power of electrons from a more saturated conductor, which has a large number of electrons associated with it, to flow into a less saturated conductor. Depending on the number of electrons, some of them maintain the potential to overcome the resistance of this conductor, and the other part of the electrons that overcome this resistance move along the conductor, while the electrons do a certain job. Moving electric charges in the medium having the acceleration of free fall of bodies in space always move around the conductor in a spiral.

In conclusion, we can say that our material world is very diverse and all the processes occurring in it from random circumstances that occur in time, in varying degrees, affect one another, therefore a new theory of multifaceted dependence is being put forward. In this world, everything is intertwined, and one phenomenon of nature is in varying degrees dependent on another. More active material bodies dominate over less active material bodies, therefore there can be no independent and constant constants, laws or physical quantities. For example, the new law of gravitation and cosmic interaction between two material bodies that are located in the space of the Solar system or another system is closely related to the new law of gravitation of one material body located in the space of the Solar system to the central star of the Sun. At the same time, the laws of gravitation and cosmic interaction are in constant dependence on the new law of the activity of a material body located in space and the new law of the acceleration of free fall of bodies in space. And the listed laws are closely related to the new law of energy between two material bodies that are in the space of the solar system and the new law of the energy of one material body located in the space of the solar system to the central star of the sun and many others...

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