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Quantum energy transfer through electric current conductor

Abstract

At present time the concept of an electric current of a conductor does not correspond to physical essence of the phenomenon. It is considered to be, that the electric current on a conductor is transmitted by moving electrons that is by material particles. But the matter motion at transmission of electric energy on a conductor has been never fixed. It is considered to be, that electron comes off one atom and passes to other atom. However the detach of electron from atom can occur only by ionization or an exposure, and in a conductor with a current such exposure (even the instant) does not leave any traces. Transmission of electric energy through a current conductor is accompanied by thermal energy output. However now the reasonable explanation of thermal energy output is absent. It is offered to present an electric current on the basis of the quantum theory as a transmission of energy by matter particles without matter motion and without ionization and also to explain the thermal energy output at electric current passing through conductor.

Keywords: electric current, energy transfer, quantum model

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Konstantin Ivanov
Almaty University of Power Engineering and Telecommunication, Institute of Mechanics and Machine Science of Kazakhstan, Kazakhstan

Correspondence: Konstantin Ivanov, Almaty University of Power Engineering and Telecommunication, Institute of Mechanics and Machine Science of Kazakhstan, Kazakhstan, Email ivanovgreek@mail.ru

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Introduction

The electric current represents the phenomenon of a transmission of energy. However the existing concept of an electric current does not correspond to physical essence of the phenomenon. The most widespread definition of this phenomenon:[1] the electric current is the directed motion of electrons (or electric charges). Electron is a particle of a matter. According to the definition the motion of electrons represents the directed motion of a matter. However no measuring instruments can fix a matter motion at transmission of electric energy on a conductor. The charged atom transfers the charge to next atom and this is electric current without electron detach from atom. It occurs analogously to a blow energy transfer by the pendulous balls in Newton's cradle. It is difficult to present, that a substance stream in the form of electrons, passing long time through a junction from different materials (for example, copper and lead) will not leave any traces in a junction place. In a place of grounding of a conductor the substance in the form of displaced electrons should accumulate. But it does not occur. How to explain the electric current transiting through a living matter, for example, through the human? Really the stream of an inorganic substance (electrons) passes through an organic fabric, not leaving any chemical changes? In an electric current conductor any transformations of a substance are absent.

It is impossible to explain also behavior of an electric current at a meeting with the capacitor as electrons cannot be displaced through isolated plates of the capacitor, creating the positive and negative charges of plates. On existing introducing moving electron comes off one atom and passes to other atom. However the detach of electron from atom can occur only by ionization or an exposure (for example, chemical by), and in a conductor to a current such exposure (even the instant) is absent (no changes of a substance occur). The thermal energy output at the passing of electrons does not correspond to logic as transmission of electrons on existing introducing is an electric current. And absence of transmission of electrons (which ostensibly call the thermal energy occurrence) contradicts concept of an electric current. It is supposed, that it is connected with overcoming of resistance to moving of electrons in a conductor which actually is not present. These contradictions refute existing representation about an electric current. The purpose of the present paper is to present the explanation of an electric current corresponding to real essence of the phenomenon, as a transmission of energy without matter motion and without matter transformation and also to explain the thermal energy output at electric current passing through conductor.

Quantum representation of an energy state of a matter

Quantum theory[2] allows you to associate the matter with its energy state (her energy level) through the use of quantum models of atom. However the existing representation of quantum atomic model mismatches mechanics laws. Following misfits occurs:

The atom gives up quantum energy at transition of electron on near orbit

Objection: Atom gets energy quantum Attractive forces (forces of gravitation) of a matter force atoms to nestle to each other. Attractive forces from surrounding atoms urges electron observed concrete atom to transition to a short-range orbit. On law of conservation of momentum the speed of electron motion on an orbit is increased. It calls kinetic energy of electron increasing and increasing of kinetic energy all atoms. The atom gains a positive quantum charge of energy. Positively charged atom possesses excess of energy and is aimed to give excess of energy to surrounding atoms. Transfer of excess of energy to the next atom occurs by transition of electron into a long-range orbit to increase in a size of atom. On law of conservation of momentum the speed of electron motion on an orbit in the remote orbit decreases. It calls kinetic energy of electron. All atoms are decreasing. The atom becomes neutral. To transition time into a remote orbit the electron under the influence of an inertial force can move not on the proximal orbital but on the subsequent.

In this case speed of electron motion will in addition decrease. It calls kinetic energy decrease of electron and all atoms. The atom

gains a negative quantum charge of energy. Further quantum process proceeds. Forces of gravitation are comparable to interatomic forces. Interacting of these forces creates dynamic quantum equilibrium. Energy level of atom is defined by a kinetic energy of the electron. This energy is proportional to a square of speed. The speed of electron on a short-distance orbit is more than on the long-distance orbit. Hence, the energy level of atom is increased at transition of electron into a short-distance orbit. For this purpose the atom should receive energy quantum, instead of to give up it. Moving of charged particles (ions) really occurs, but only at galvanising. This process is accompanied by matter carrying over. The current leakage on a conductor is never accompanied by matter carrying over to an aspect electrons. For example in a point of contact of a copper wire with the iron terminal traces what or a new matter on the iron terminal are absent irrespective of current transit time.

The atom (an atom kernel) brings electron to transition to a short-distance orbit

Objection: Attractive force of gravitation of a kernel of atom is an internal force. The internal force has no additional resource for transfer of electron into a short-distance orbit. Only external forces can bring electron to transition on short-distance orbit.

The atom size (radius of orbital) is not connected with interacting of atoms

Objection: Attractive Gravitational forces of a matter are aimed to constrict interacting atoms and to reduce sizes of atoms (usually 5 atomic radiuses are possible). These external forces for each atom can displace electron into a short-distance orbit and give the energy quantum to atom. The atom kernel cannot force electron to pass to a short-distance orbit as the gravitation internal force is capable only to keep the electron. If the atom gains the energy quantum from external forces then the electron increases the speed and it passes from a short-distance orbit to a long-distance orbit. Gravitational force of attraction combines with an electric attractive force. The general attractive force of electron to nuclei is equal to a centrifugal force of electron, which directly proportional square of speed of electron. An attractive force of electron to nuclei of atom is observed, not gravitational force in the pure state. The balance of an attractive force and centrifugal force call a dimensional change of atoms. It calls matching physical effect of increase or decrease of sizes of atom.

The role of source of current is not connected with atom sizes

Objection: The current source transfers energy quantum to the proximal atom and reduces a size of this atom, by elastic compression. The atom gains a charge of energy (quantum). Changing of sizes of atom as a result of acquisition or loss of photon matches to change of orbital which has the spherical form at laws of mechanics.

The mechanism of transfer of energy quantum is not connected with atom sizes

Objection: Transfer of energy quantum from the previous atom to the subsequent atom occurs by instant expansion of the previous atom and compression of the subsequent atom. This process is similar to process of transfer of an energy blow by elastic spheres. It is impossible to create correct representation about transfer of electric energy without the coordination with mechanics laws. For example, to explain superconductivity. The quantum model of transfer of electric energy offered by me matches to the resulted objections. The main energy property of matter is the mutual attraction of particles, atoms, molecules, resulting in compression of matter and energy accumulation. Compression of matter is accompanied by a decrease in the sizes of atoms by electrons displacement in orbits (or orbitals), which are closer to the nucleus. This property leads to the property of quantum state of matter - radiation energy of interacting atoms by moving of electrons on remote orbits with the expansion of the atoms. If some of the mass of matter is increased at the expense of attraction and addition of additional particles, then a density of mass and the energy level of the mass increases. Gravitation of matter, which is associated with increasing mass density, strives to increase her energy level (from the simple approach of the particles with heating of matter in the plasma state, and later in the state of the black hole). Attraction Gravity seeks to squeeze atoms and accumulate energy and atoms seek to expand and give energy. We can say that the matter "breathes" by energy. "Breath" matter is capture of energy atoms when they are "expansion". "Exhale" matter is a return of energy to atoms through their "compression".

If we will consider traditionally the atom as isolated one, it emits a quantum of energy when moving from remote orbit to near orbit. For example, as a result of the cooling of electron its speed is slowing, centrifugal force is decreasing, and under the influence of gravity attraction, the electron passes on a near orbit. If we consider the atom in the neighborhood with other atoms, i.e. in the mass at a constant temperature, it should be recognized that the acting of the environment of neighboring atoms under consideration atom takes place. Gravity exerts pressure on the atom, and electron is forced to go to the orbit nearer to the nucleus. External environment gives the quantum of energy to the atom. The energy of the atom is increasing because of the gravity increasing (due to reduction of the radius of the electron orbit), and accordingly centrifugal force is increasing (due to the increase in running speed of the electron). The gravity increases only by way of increasing of mass density because the decreasing of inter-distance between particles takes place.

Increase of the atom energy leads to increased exposure of the atom on the environment, on neighboring atoms. Electron strives to go to remote orbit by pushing neighboring atoms. Atom gives quantum energy to the environment. Dynamic equilibrium is established. The matter "breathes" by energy. Compression of matter leads to the accumulation of the stock of its potential energy. From this perspective, we will assume that the atom with the electron, approximated to the nucleus, has excess energy, and the atom with the electron, distant from the nucleus, has lack of energy. The increase in mass of matter leads to an increase in the force of gravity and increasing the density of matter. The gravitational potential is a potential of an interaction attraction of corpuscles of a matter under the universal gravitation law - law of universal gravitation. It becomes comparable to electric forces at ultrahigh concentration of a matter. The density increasing of the matter leads to electrons transition on the closer orbits. This leads to an increase in the force of attraction of the electron to the nucleus. Therefore, according to the laws of mechanics an electron orbital motion speed (while maintaining the kinetic moment) should increase. At the same time centrifugal force, which opposes to gravity, must increase. So it should be recognized that the transition of the electron on the inner orbit under the action of gravitation forces is associated with increase of energy level of the atom and vice versa.

However, consideration of isolated atom or in the environment is not essential for further description. It is important to keep in mind

that the atom can have different energy levels. According to the quantum theory the interaction of atoms leads to exchange of quanta of energy. Therefore, the energy level of the atom is the main property of energy transfer based on quantum theory. Transfer of energy from atom to atom occurs not by tearing off electron from atom, but by the changing of the electrons orbits with radiation and transfer of energy quanta. The energy level of atom defines the energy charge transmitted by the atom, in the form of electric charge. Therefore, it is logical to consider the energy level of atom as its electric charge despite the assumption, that the atom is electrically neutral. Positive or negative charge of atom should be defined by its energy level. An electron has a negative charge relative to the nucleus of atom, but electron cannot be considered as a carrier of negative electric charge in tearing from atom. The carrier of the energy charge is not electron but atom that has different energy levels. Therefore the energy charge of atom should be considered as its electric charge when energy transfer takes place. This representation of the atom gives the opportunity to represent the electric charge of atom through added or remote energy quanta.

Known methods of creation positively or negatively charged matter (e.g. through friction) can be seen as ways of the accumulating of atoms with high or low level of energy charge. The matter has a store of energy of atoms. As it is known, the energy store of matter can be changed without changing the mass of the matter and without changing the number of electrons in an atom (for example through friction). By that it is possible to create positive and negative potential of matter. The combination of atoms with high energy level will define the positive potential. The combination of atoms with a low energy level will define the negative potential. With this approach the creating of positive and negative potentials of matter will correspond to the quantum nature of matter. Then the energy transfer under the influence of the difference of potentials can be presented on the basis of quantum theory.

Quantum model of energy transfer

As it is known, according to quantum theory[2] an electron in an atom can have 5 energy levels corresponding to different orbits (or orbitals). We will be use simplified representation about energy charge of atom. We will suppose that atom can have the elevated, neutral and low energy levels depending on the position of the electrons on orbit. Undoubtedly, energy transfer is associated with the energy level of atoms. Therefore, we assume that the energy level of an atom defines its electric charge, i.e. a charge of energy. We will accept, that the atom with heightened level of energy (when electron is located in the orbit nearest to the nucleus) has a positive charge, and atom with the reduced level of energy (when electron is located in the orbit most remote from the nucleus) has a negative charge. A charge of atom with electron, located on an average orbit, we will consider as neutral. Thus, the notion of positively and negatively charged poles would be completely based on the categories of energy. Categories of matter in the form of excess or shortage of electrons in an atom are here excluded entirely.

In this view of the atom its positive or negative charge has nothing to do with the chemical composition of a substance or to the change of the number of electrons in atom. It essentially approximates the model of substance to the objective reality. It is possible to represent the creating of positively or negatively charged poles as an acting which is adducing to the accumulation of positively or negatively charged atoms (i.e. atoms that have the same number of electrons but different energy levels). It basically distinguishes the offered model from a dipole model. The source of electrical energy creates the positively or negatively charged poles of matter. It is possible to use other acting on matter for creation of poles (e.g. friction). Let us to formulate the principle of quantum energy transfer: the energy transfer occurs through the transfer of energy quanta of interacting atoms. Energy transfer occurs from the positive potential to the negative potential by way of changing of electrons orbits without separation of electrons from atoms. Such identification evidence is based on the elementary laws of mechanics of interacting of the bodies rotated on orbits in relation to a body in the centre of an orbit with the account not only a gravity, but also electric forces.

Quantum energy transmission principle is based on the following affirmation: the interaction of an atom with a high energy level and atom with low energy level leads to transfer of energy quanta from one atom to another.

When transmitting electrical energy occurs the quanta of energy represents an electric charge, the atom with a high level of energy is positively charged atom and the atom with a low level of energy is a negatively charged atom. In electrical terms: when interacting of positively and negatively charged atoms occurs the positively charged atom transfers an electric charge to the negatively charged atom. The process of energy transfer can take place both through direct interaction of two atoms and through neutral atoms between them. Other way of transfer of a charge in the absence of transition of electrons from one atom to another simply does not exist. Let us represent the objects of energy transfer graphically. On Figure 1 graphic images of atoms with neutral, positive and negative charges are presented. The image of the atom on the diagram corresponds to the image of an electron orbit. The orbit of electron of neutral atom is shown by the thin line. The orbit of electron of positively charged atom is shown by internal contour line. The orbit of the electron of negatively charged atom is shown by the external contour line. The transition of an electron from the inner orbit to a neutral orbit occurs with emission of energy quanta from atom, and the transition of an electron from the external orbits on neutral orbit occurs with the absorption of energy quanta from the external environment. When these transformations are occur the graphic images are changing accordingly.

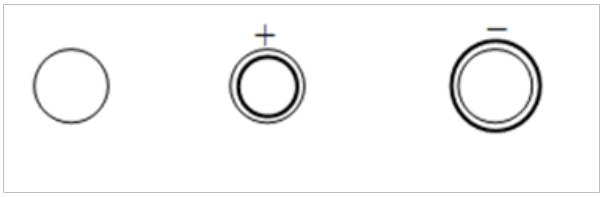

Figure 1 Graphic representation of atoms with different charges.

It is possible to simulate the quantum energy transfer method as energy transfer through a line of motionless elastic balls which are hanged on vertical threads (Figure 2). These balls do not have a store of energy and they are shown by thin lines. The left raised ball with thread, rejected from the vertical position, gets the store of potential energy. The ball which received the energy store is shown by a contour line. The last right ball which is hanged on the vertically thread does not have a store of energy (it is energy-neutral). When the left ball is dropping, it goes into position with the vertical thread and returns the energy store to the adjacent right ball. The resulted description of simulation is based on mechanics laws. The potential energy of the left ball turns into the blow energy. Due to the elastic forces this blow energy is transferring through the line of motionless balls at the right

ball which is vertically hanging. The blow energy received by this ball leads to his rejection into the upper position. Thus, the energy store of the left ball has passed to the right ball. Passed energy store simulates quantum of energy. Transfer of blow energy by the chain of motionless balls simulates the quantum way of energy transfer without motion of balls, i.e. without motion of a matter.

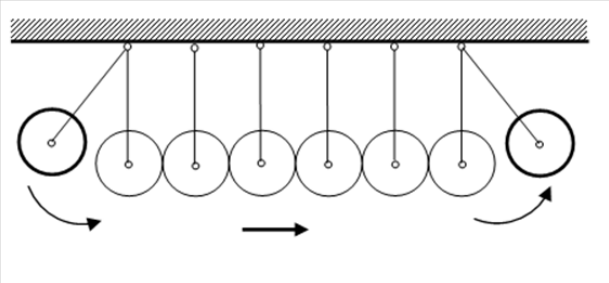

Figure 2 Transmission of blow energy through motionlessly hanging balls.

Transfer of energy from the positively charged atom to the negatively charged atom through a conductor with neutral atoms (Figure 3) occurs similarly to energy transfer through line of motionlessly hanging balls (Figure 2). The transfer of energy quanta from a positive charged atom on the left through a conductor with neutral atoms to the negatively charged atom on the right is due to the potential difference of extreme atoms. Initially, all atoms are neutral. The source of electric current creates a potential difference. It takes the of energy quantum from the right neutral atom and gives this energy quantum to left neutral atom. The left atom becomes positively charged, the right atom becomes negatively charged. Quantum energy on conductor is passed through neutral conductor atoms due to the forces of quantum energy of interaction which are similar to elasticity forces of balls on Figure 2.

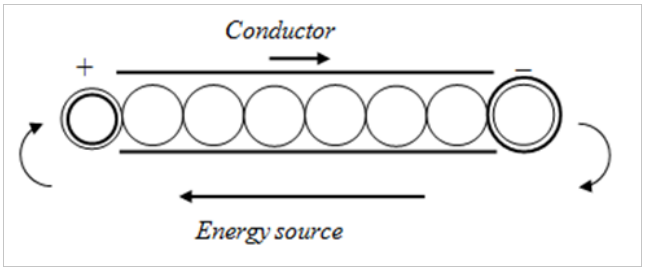

Figure 3 Transmission of quantum of energy in a conductor through neutral atoms.

Transmission of quantum of energy from a positive pole to a negative pole can be simulated by means of a line-up of billiard spheres (Figure 3). The model of a transmission of energy contains a positive pole - a sphere at the left, a negative pole - a sphere on the right, a conductor - a line-up of neutral spheres between poles and an energy source - a billiard cue which makes blow on a sphere at the left. It is possible to present the quantum of energy arriving at the left, as energy of blow by cue in an arrow direction on the left billiard sphere. The left sphere acquires quantum of energy and becomes as positive charged pole. After a touch with a neutral sphere of a conductor the left sphere transmits energy quantum on a conductor through a line-up of neutral spheres to the right, and it becomes neutral before deriving of following cue blow. Last neutral sphere of a conductor on the right transmits the energy quantum to the right sphere which was a negative pole because of deficiency of energy (because the energy quantum was taken from it by the energy source and it was transmitted to a positive pole). The right sphere becomes neutral. After that the energy source takes again quantum of energy from the right atom and transmits it to the left atom. Process of transmission of quanta of energy by cue through a conductor proceeds and lasts until the energy source (cue) is working. Thus, the energy source (cue) creates positive and negative poles and provides a transmission of energy from a positive pole to a negative pole without matter motion.

Otherwise it is impossible to present an energy transfer without moving of electrons on a conductor

Transmission of electric energy by a conductor containing multitude of atoms occurs similarly. It is necessary to mark, that at transmission of an electric current by a conductor not all quanta are transmitted from a positive pole to the negative. The part of quanta is linked with transition of electron into such orbit which saves energy quantum in atom and translates this quantum into thermal energy. At a meeting with the capacitor the electric current in the form of energy quanta collects on plates of the capacitor with different charges without transition of electrons from one plate to another. It occurs without matter motion between capacitor plates. Accumulation of positive charges (or atoms with a heightened energy level) on one plate of the capacitor is accompanied by accumulation of negative charges (atoms with the reduced quantum level) on an opposite plate of the capacitor. Thus the damping oscillating process reflecting certain inertia of transmissions of quanta of energy takes place. The quantum way of a transmission of energy allows giving the energy introducing about electric current. The electric current is the directed motion of quanta of energy, instead of material particles motion (motion of electrons) which can come off from nucleus only at ionization, but ionization is linked with change of a chemical compound or with acting. Ending definition: the electric current represents the directed motion of electric charges in the form of energy quanta. Such is essence of a quantum way of transmission of electric energy (electric current).

Thermal energy output by an electric current in a conductor

The quantum way of transmission of electric energy allows explaining the thermal energy out in an electric current conductor. This explanation is grounded on the fact that electron can settle down in many cases in five possible orbits (or orbitals). Atom with electron on an average orbit we will consider as neutrally charged. Two approximate and two remote orbits in relation to a neutral orbit take place. It matches to obvious balance. The atom charge creates a source of an electric current which translates electron into the approximate or remote orbits. Transmission of an electric charge by each atom occurs by transition electron from the orbit approached to a nucleus into the remote orbit. The atom charged positively can transmit as much as possible two quanta of energy to the next atom and further on a conductor to negative potential. However the next atom can repel to transmission of quanta from adjacent atom. In this case the quantum which remained in adjacent atom, defines the thermal energy quantum. Thus, each atom can transmit two quanta of electric energy or one quantum of electric energy with saving one quantum of thermal energy. The variant of transmission by atom of two quanta of electric energy with saving one quantum of thermal energy or on the contrary is possible. It matches to obvious balance between power levels of electrons on 5 orbitals.

Conclusion

The introduced model of quantum transmission of electric energy characterizes only a transmission of energy in the pure state without matter motion (that is a transmission of energy in a "pure" aspect). The quantum model of a transmission of energy corresponds to reality. Other model of an energy transfer in a conductor with a current without matter moving simply does not exist now. Only atoms are capable to transmit energy by the quantum way (without matter motion). Electron, proton and neutron are transmitting energy by matter motion, creating corresponding aspects of radiation. The quantum way of transmission of electric energy allows eliminating all contradictions which take place at representation of an electric current which now is used. Quantum way of transmission of electric energy permit to explain the thermal energy output at electric current passing through conductor. Quantum representation of a transmission of energy is capable to change understanding about the nature of many phenomena of electrical engineering and physics of elementary particles, as it shows the possibility of an energy transfer by quanta, instead of moving corpuscles.

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Conflicts of interest

The author declares there is no conflict of interest.

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