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Electromagnetic radiation on human function physical mechanism

Abstract. *It is based on the molecules that make up the human body cell, discuss on ion and molecular inside the cell affected by alternating electromagnetic field .The cell affected and vibrated as a model, the paper also detailed analyses the electromagnetic wave physical mechanism on human body function.*

Streszczenie. *W artykule analizowano wpływ pola elektromagnetycznego na organizmy żywe. Zaproponowano model matematyczny komórki umożliwiający analizę działania pola elektromagnetycznego. (**Wpływ promieniowania elektromagnetycznego na funkcjonowanie organizmu ludzkiego**)*

Keywords: Alternating electromagnetic fields, Molecular polarization, Molecular vibration, Electromagnetic wave strength.
Słowa kluczowe: pole elektromagnetyczne, wpływ pola elektromagnetycznego

Introduction

Our living space is full of all kinds of electromagnetic waves. The electromagnetic waves actually have influence to the health of people, the debate, full of controversy. This is a complex problem, and it involves physics, human physiology, medical, and many other disciplines.

Charge according to certain regular exercises form alternating current. Alternating current stimulate the alternating electromagnetic field. Alternating electromagnetic field and stimulate each other. In the form of waves spread in space, it is the electromagnetic waves.

X rays, and gamma rays, cosmic rays are electromagnetic waves. Now used for radio communication and the electromagnetic wave of radio frequency range is $10^5 \sim 5\times10^{10}$ Hz (The wavelength range for $3\times10^{13}\sim10^{-2}$ M).Light is also the electromagnetic wave, the frequency of which is higher than normal electromagnetic wave. The visible light frequency range is $3.8\times10^{14} \sim 7.8\times10^{14}$ Hz (The wavelength range for $3.8\times10^{-7}\sim7.8\times10^{-7}$ M).

X rays, and gamma rays, cosmic rays are also electromagnetic wave, their frequencies higher, shorter wavelengths. Different wavelengths of electromagnetic wave show the different properties. Such as lower frequency electromagnetic wave (long) can spread along the surface, and can spread in underwater. And the frequency of electromagnetic waves for dozens of MHz almost can only be spread along the straight line. In the visible range of electromagnetic wave frequency is visible light, and it can cause our visual response, so that we can see the world around him. Relatively short wavelengths X-ray has strong penetration ability, can through the bone, steel plate.

2. Electromagnetic wave effect to charged (electrically charged ions)

Charge (or charged ions) in electric field should be effected of the electric field force, as shown in figure.1 shows: Charge q in electric field by force of E, F = q E

If the quality of the body charged for m, is charged in the body under the action of forces produce a acceleration:

(1) A=mF=MqE

If it is alternating electric field, E direction, size changes, then charged body by force and the resulting acceleration changed also. If the electric field force is big enough, enough to let a body be accelerated motion and change its position in space, then charged body will be in the role of alternating electric field under the periodic vibration. If charged body by electric field force is small, compared with other external forces can be ignored, so, electric field force charged to the influence of the motion state can also be ignored.

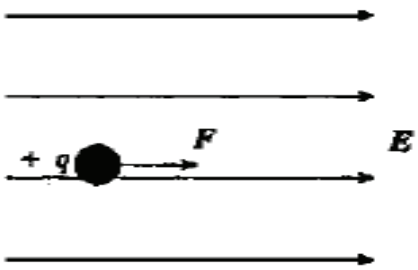

Fig.1.Charge q in electric field by force of E

Charged body in magnetic field usually will be affected by the Lorentz force,

(2) F=kqv×B

One of the conditions of stress is charged with magnetic field to a body relative motion. For the charged body in alternating magnetic field, even if it remains stationary, because of the size of the magnetic field and direction on the change, they also place of relative motion. Charging by the magnetic fields, force F and magnetic field of vertical direction B.

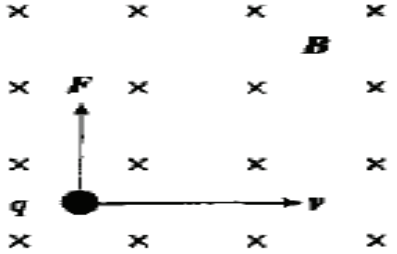

Fig.2.Charged body in magnetic field affected

As shown in figure.2, for the plane wave, because the E and B is perpendicular, electric field force and magnetic force of charged body in general is perpendicular.

The size of the force Florence is directly proportional not only to the strength of magnetic field force, but also to the speed of the relative motion.

For still charged body in alternating magnetic field, the magnetic field changes the quicker (the higher the frequency), the bigger by the force of magnetic fields.

The human body structure is very complex, and many studies have shown that people thinking activity, neural information transfer are related to electrical signals (electrical impulses).The human body is by molecular composition is conductor. The human body contains moisture 70% or so, most of the cells in the human body organization moisture that dissolve NaCl etc salt, NaCl solution is a good conductor. It is the main reason why people touch the electric current and it through the human body.

This kind of cell like NaCl to be soluble in water molecules ionize Na+ and Cl^- and like the water molecules H2O these molecules is not as complete as NaCl ionization. But it has polar molecules. These ions and polar molecules in the role of the electromagnetic force will turn to move, to be directed, will change its position, as shown in figure. 3,

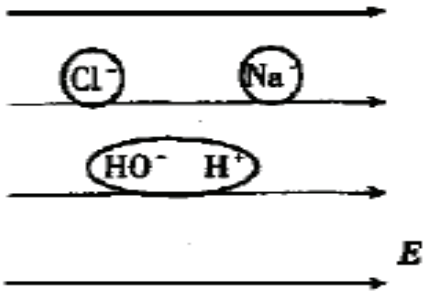

Fig.3. NaCl ionization in the role of the electromagnetic force

3. The effect of alternating magnetic fields to charged ions and polar molecular

The electromagnetic wave is alternating electromagnetic fields. Charged ions and polar molecular once in the electromagnetic field of alternating must be by the role of the electromagnetic force, but if an displacement, the key is the size of the force. The following are three points to discuss.

At this time the ion and polar molecules from the electromagnetic force is very weak, which is not enough to make the ion occurring directional movement, which is not enough to make nonpolar molecule happened molecular polarization. Therefore weak electric magnetic field almost does not affect the normal state molecules. Of course it will not affect the normal cell physiology function. This kind of electromagnetic field on human health effects is very weak, and we live in a space full of such as electromagnetic field.

The kind of magnetic force makes the cells of charged ions for directional movement, makes some molecular polarization after steering move. Due to the size of the force Florence is related not only with magnetic induction, but also with charging body and magnetic field of the relative velocity. So the frequency of alternating electromagnetic field is the higher, the greater the relative speed, the bigger by force. Ion and polar molecules in the cell vibrate under alternating electromagnetic field. Because these ions and molecular stack the vibration caused by alternating electromagnetic field, the movement rate speed up, thus to raise the temperature, not enough to damage cells structure.Cells will not completely lose its physiological function, but the normal cell physiological function will be affected.

It could make ions and molecules inside the cell intense vibrate under high electromagnetic force, a significant amount of heat, local temperature lifts quickly, then damages cellular structure and makes cell loss normal physiology function. Belong to this kind of situation is the example: High frequency smelting furnace, Microwave oven, broadcast transmitting station, Television Station transmitting antenna. This kind of electromagnetic field on the dangers of man is without doubt.

4. Conclusions

By the analysis of the front known, the higher the frequency of the electromagnetic wave, the bigger the relative speed of the magnetic field, the bigger the Florence force by it.

On the other hand, the higher the frequency is, the shorter the cycle is and more close to mechanical vibration of molecular and ion inside cell. That is to say, the electromagnetic wave, the higher the frequency is, the greater the impact on the human body is.

But effects on people also can't use frequency level to measure. Such as the frequency of the visible light is very high, people are not afraid of it. People often exposed to the sun lives very healthy. X-ray is of high frequency electromagnetic wave, if the human body irradiated by the larger doses of the X ray is likely to develop cancer, it is known to all. Gamma rays is higher frequency, and a certain intensity of gamma rays can kill human tissue cells, and the famous "γ knife" is a good example.

In short, the electromagnetic waves have an influence to the human body. The extent of the impact is directly related to the electromagnetic wave strength, and is also related to the electromagnetic wave frequency.

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