Chapter 4. The Processes of Energy Extraction

Contents

Introduction

Further, in Chapter 5 the processes the processes of energy transformation on the assumption that rotating magnets initiate the process of energy extraction from the environment are considered. Here we shall concentrate on the nature of this process.

The presented theory is confirmed by the existence of so called "magnetic walls", while there are no other explanation for this phenomenon. As this effect is of great importance for the proof of this theory's relevance, it would be advisable to repeat the description of this effect from [14].

> "One more effect, never mentioned before, has been observed - an effect of vertical magnetic walls around the device. An anomalous magnetic field, surrounding the converter, has been observed.
>
> Zones of increased intensity of magnetic field, about 0.05 T, located axially from the center of device, have been observed. The direction of magnetic field vector in these walls coincided with the direction of the roller's magnetic field vector. The structure of these zones resembled ripples on the water from a thrown stone. Between these zones a portable magnetometer using Hall generator as a sensor, did not register anomalous magnetic field. The layers of heightened intensity extend practically without weakening to a distance of about 15 m from the center of converter and lower quickly on the border of this zone. The layer's thickness is 5-8 cm. The layer's border

> is abrupt, the distance between layers - 50-60 cm and increases a little with increased distance from converter's center. A stable picture of this field was observed also at a height of 5 m above the device, on the second floor above the lab. Measurements above this height haven't been performed.
>
> At the same time an anomalous temperature fall has been observed in the immediate vicinity of the converter. With general background of +22ºC a temperature fall of 6-8º C has been observed and measured. The same phenomenon was observed also in vertical magnetic walls. The temperature measuring within magnetic walls were performed with a common alcohol thermometer with measurement inertia of about 1.5 min. Within magnetic walls the temperature changes are felt even by bodily sensations: after placing a hand into magnetic wall thickness the cold is felt immediately. Similar picture was observed at the height of 15m above the device, on the second floor of the laboratory building, notwithstanding the armored concrete ceiling covering."

Here two facts are significant: 1) the existence itself of magnetic walls, and 2) the temperature fall within the walls. Further it will be shown that such walls may be explained by the existence of certain stationary waves with variable energy density. The proof of their existence is given in Supplement 4. Energy processes in the domain of these waves are given there. The assumption is made about energy exchange between such wave and environment.

But first (in Sections 1 and 2) for comparison we shall cite some known statements of electromagnetic waves theory.

1. Running Electromagnetic Wave

There exist running electromagnetic waves, i.e. an electromagnetic field propagating in space and time. A plane sinusoidal progressive electromagnetic wave is described by the formulas

$$E = E_o \mathrm{Cos}(\omega t - \beta z) \tag{1}$$

$$B = B_o \mathrm{Cos}(\omega t - \beta z) \tag{2}$$

where

E_o, B_o – amplitudes of intensity fluctuations for electric and magnetic fields accordingly,

t, z - time and linear coordinate accordingly,

ω, β - time and space frequencies accordingly.

In a progressive electromagnetic wave the electric and magnetic fields undergo reciprocal transformations. The volumetrical density of electromagnetic energy is

$$w = \frac{\varepsilon E^2}{2} + \frac{B^2}{2\mu}, \tag{3}$$

where ε, μ – absolute electric and magnetic permeability accordingly.

In any point the electromagnetic energy changes with time from zero to a certain maximum. Consequently, such electromagnetic wave transfers energy. With its propagation a flow of electromagnetic energy is generated. The energy flow in electromagnetic wave may be specified with the Pointing vector**,** whose direction coincides with the wave propagation direction, and the module is equal to

$$P = E^2 B^2. \tag{4}$$

The energy flow emanates from the source of the running electromagnetic wave.

2. Stationary Electromagnetic Wave

Stationary sinusoidal (harmonic) electromagnetic wave (which may be obtained by composition of two waves- falling on an ideal mirror and reflected of it) is described by formulas

$$E = E_o \mathrm{Sin}(kz)\mathrm{Sin}(\omega t), \tag{1}$$

$$B = B_o \mathrm{Cos}(kz)\mathrm{Cos}(\omega t). \tag{2}$$

In this wave the intensity in all points changes with time with the same frequency and in one phase, and amplitude changes according to harmonic law depending of coordinate Z.

From the formulas (1) and (2) it is evident that oscillations E and B are shifted in phase for a quarter of period. It means that when the intensity of electric field reaches its maximum, the values of B are equal to zero.

As was pointed above, the energy flow density of electromagnetic waves is determined by Pointing vector. As in the nodes the value of E or B are equal to zero, it means that in these points the flow is equal to zero – see (12). The nodes for E are coincident with antinodes for B and vice versa. It means that there is no electromagnetic energy flow through the nodes and antinodes. However, as E and B in other points are changing with time, we may conclude that with time the energy moves between adjacent nodes and antinodes. With this there occurs energy transformation of electric field energy to magnetic field energy and vice-versa. The total energy contained between two adjacent nodes and antinodes stays constant.

For preserving an ideal stationary wave no external energy inflow is needed.

3. Volatile Stationary Electromagnetic Wave

This term will be used for a sinusoidal (harmonic) electromagnetic wave which is described by formulas

$$E = E_o \mathrm{Sin}(kz)\mathrm{Sin}(\omega t) \quad (1)$$

$$B = B_o \mathrm{Sin}(kz)\mathrm{Sin}(\omega t) \quad (2)$$

where E_0, B_0 – the amplitudes of intensity oscillations in electric and magnetic fields accordingly. In this wave the oscillations of electric and magnetic fields are co phased along ox and oz axes (if this condition is fulfilled, other combinations of Sin and Cos are possible). The possibility of such fields' existence is shown in chapter 3.

As was stated, the density of electromagnetic waves energy flow is determined by Pointing vector. As in the nodes the values of E and B are equal to zero, in these points the flow is equal to zero. It means that there is no energy flow through the nodes.

This energy changes periodically with time from zero to a certain maximum. Hence, for the existence of a volatile stationary wave, it must get energy from the outside and be transformed into electromagnetic energy.

Further we shall introduce the concept of volumetrical power of energy exchange. This volumetrical power is a derivative on time from volumetrical energy.

Figure 1 presents the functions of energy and capacity with respect to time. The part of capacity function, marked by dots, presents the power derived by the stationary wave. The part not marked by dots presents the power delivered by the stationary wave. In the project it is shown that the average volumetrical power, derived and delivered by the stationary wave, is equal to

$$P_2 = \frac{w_o \omega}{2\pi}. \quad (3)$$

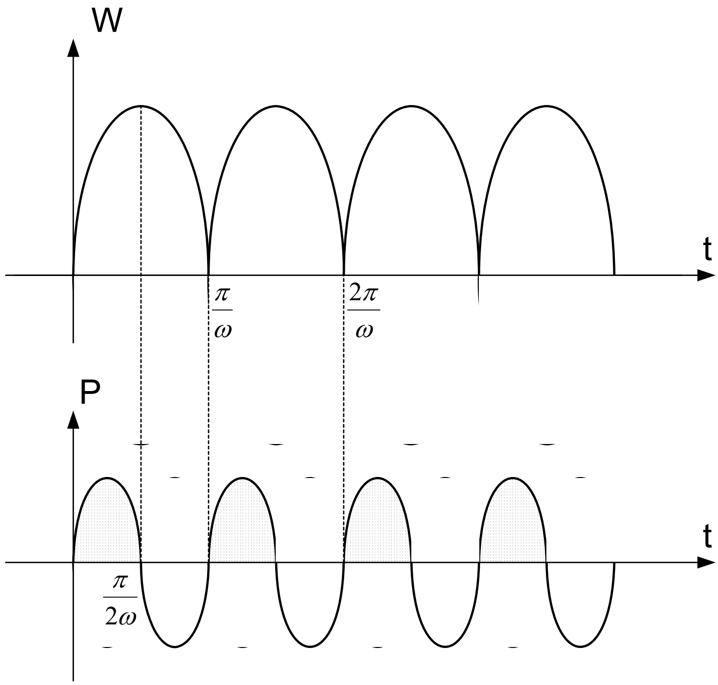

Fig. 1.

4. The energy of Volatile Stationary Electromagnetic Wave

It may be assumed that the following statement is true

Statement 1.

> A volatile stationary wave (VSW) exchanges energy with the environment

We shall call first medium the environment in which the wave exists. The outer environment will be called second medium. If the temperatures of these mediums differ, then there will be a heat flow from the second (warmer) medium to the first medium. On the base of statement 1 in the project it is shown that the power of the heat flow is

$$P_1 = \frac{\lambda}{L^2} \cdot T_m \left(\frac{вт}{м^3} \right), \qquad (1)$$

where

λ - the heat conductivity of the medium during energy transfer between air layers with different temperature $\lambda \approx 0.025 вт/(м \cdot К)$,

L - the distance between the first and second mediums (the width of intermediate layer),

T_m - the temperature difference between the first and second mediums.

Further it is shown that there exists the following differential equation of cooling

$$\left(P_2 - \frac{\lambda}{L^2} T_m \right) = D \frac{dT_m}{dt}. \tag{2}$$

where

P_2 - is determined according to (3.3),

$D \approx 860 Дж/\left(м^3 К\right)$ - a certain constant.

The solution of this differential equation is as follows:

$$T_m = \frac{P_2 L^2}{\lambda} \left(1 - e^{-\frac{\lambda}{L^2 \cdot D} t} \right). \tag{3}$$

Thus, the established temperature value is

$$T_{mo} = K_\omega \cdot \omega, \tag{4}$$

where

$$K_\omega = \frac{w_o L^2}{2\pi \cdot \lambda} (сек \cdot К), \tag{5}$$

i.e., the established value of temperature difference between first and second mediums depends on the frequency of magnetic wave.

The duration t_o of transitional cooling period may be found from the condition:

$$t_o = -\frac{\ln(0.05) L^2 \cdot D}{\lambda}. \tag{6}$$

5. Assessments and conclusions

The experiments with Roshchin-Ggodin device and our calculation of electromagnetic waves permit us to assert that the presented theory

1. shows that the existence of a volatile stationary electromagnetic wave does not contradict the energy conservation law,
2. shows that a temperature fall occurs around this wave,
3. conforms with the experiments.