2001년도 대한전기학회 전기기기 및 에너지변환시스템학회 춘계학술대회 논문집(2001.4.19~21)

기존의 적산전력계측 개념의 새로운 평가

A CRITICAL NOTE ON THE CONCEPT OF THE CONVENTIONAL INTEGRAL ELECTRIC POWER METERING

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ABSTRACT - Conventional potential concept does not allow different currents before and after the electric load.
Experimental examples in case of bioloads show a lot of different currents before and after the bioload, which means that the true potential concept is not the conventional concept from Coulomb attraction energy but the new concept from Gibb's free energy. Gibb's free energy is a kind of potential heat energies and also they are rotating electromagnetic waves.
We might think that electric current is not a flow of electrons but a flow of rotating electromagnetic waves, which induces electrons' vibrations.
A new measuring method for integral electrical power is suggested for the new Gibb's free energy concept.

1.Coulomb Attraction Energy and Conventional Voltage Concept

Every charge attracts on repulses the other charge, which is called Coulomb force(F).
And it produces an electric field(E) in free space [Ref.1].

$$F=\frac{1}{4\pi\varepsilon_0}\frac{q_1q_2}{r^2}(Coulomb\ force) \quad (1)$$

where $\frac{1}{4\pi\varepsilon_0}$:related constant

q_1, q_2: charges

The electric field is defined as follows.

$$F=q_2E \quad (2)$$

where $E=\frac{1}{4\pi\varepsilon_0}\frac{q_1}{r^2}$ (2-1)

The electric potential energy is

$$W=\int Fds=\int q_2Eds=q_2\int Eds=q_2V \quad (3)$$

where $V=\int Eds$ (3-1)

here s: distance

Equation (3-1) means that conventional electric voltage was defined from Coulomb attraction energy.
The electric power(P) is defined as the time rate of the electric energy as follows.

$$P=\frac{dW}{dt}=\frac{dq_2}{dt}V=iV \quad (4)$$

And also

$$W=\int Pdt=\int\frac{dW}{dt}dt=\int\frac{dq_2}{dt}Vdt=\int Vdq_2=q_2V \quad (5)$$

The used integral electric power is the sums of the current multiplied by the voltage drop of the load according to the time passed.

2. Gibb's Free Energy and New Voltage Concept

The cell reaction produces Gibb's free energy change [Ref.2].
If it involves n electrons the relation is

$$nF\varepsilon\le-\Delta G \quad (6)$$

where F: Faradays constant

ε : cell potential

ΔG: Gibb's free energy change

We see that the cell emf is proportional to $(-\Delta G/nF)$, which is the decrease in Gibb's free energy of the cell reaction per electron transferred. The cell emf is therefore an intensive property of the system.

$$nF\varepsilon_{rev}=-\Delta G \quad (7)$$

where ε_{rev}: reversible cell potential

The Gibb's free energy is the kinetic energy part of the open π-ray, which pushes the electron

$$nF\varepsilon=\Delta G=2nh\nu(1-\frac{r_0}{r}) \quad (8)$$

where h is Plank constant, $(\frac{r_0}{r})$is implosivity of the open π-ray, ν is frequency of the open π-ray and also two π-rays are produced per the induced electron[Ref.3].
Conventional electric potential is from Coulomb force of

the charges while this cell emf is from the kinetic energy of the open π-rays' flow through the conducting wire. The open π-rays are produced when a crystal structure changes to liquid solution in minus pole and then they are used for crystallizing of liquid solution in plus pole [Ref.4].

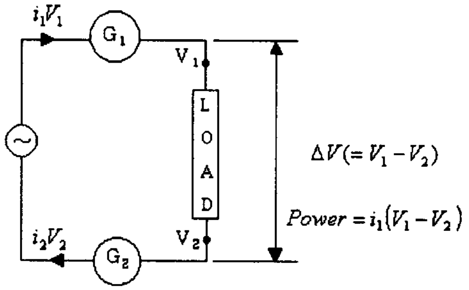
3. New Metering Method of Integral Electric Power

Conventional integral electric power was measured by the potential difference of the load multiplied by the entering current to the load as Fig.1

i_1: *entering current*

i_2: *exiting current*

V_1: *entering voltage*



V_2: *entering voltage*

G_1, G_2: *galvanometers*

Fig.1 Currents and Voltages before and after Electric Load

However the consumption of Gibb's free energy during the loading induces the current value reduced because the driving (pushing) energy for the electrons is coming out of the Gibb's free energy.

New metering method of the integral electric power is as follows.

$$W(\text{소비전기에너지}) = (i_1 V_1 - i_2 V_2)\Delta t$$
$$= (i_1 V_1 - i_1 V_2 + i_1 V_2 - i_2 V_2)\Delta t$$
$$= i_1(V_1 - V_2)\Delta t + (i_1 - i_2) V_2 \Delta t \quad (9)$$

where Δt:passed time interval

$\Delta t\ i_1(V_1 - V_2)$:conventional integral electric power

$\Delta t(i_1 - i_2) V_2$:newly metered spent Gibb's free energy

The second term in equation (9) is not negligible particularly in the newly emerging industrial fields.

An experimental example was conducted with human body by Autonomic Bioelectric Response Recorder(ABRR). Seven kinds of measurements have different placement of the electrode each other.

1. between right hand and right forehead
2. between right forehead and left forehead
3. between left forehead and left hand
4. between left hand and right hand
5. between right hand and right foot
6. between right foot and left foot
7. between left foot and left hand

ABRR supplies constant power of 13 Hz low frequency and then measures electric currents before and after the seven kinds of the loads.

The measurements were done two times as in Fig.2.

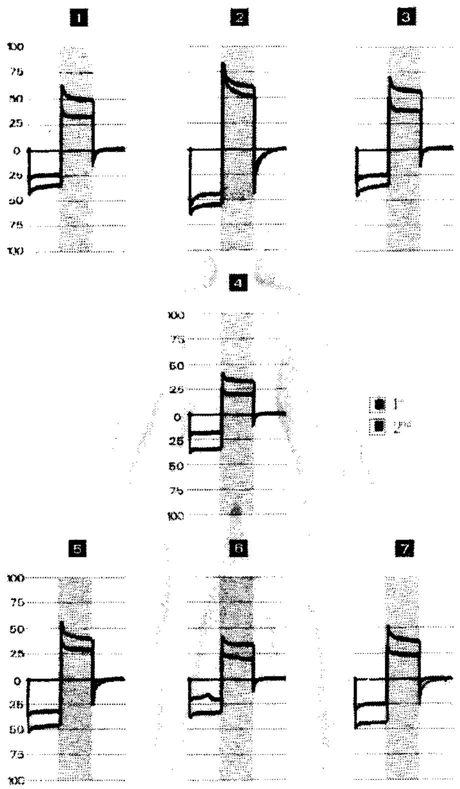


Fig.2 Electric currents before and after bioloads and reductances

We can see two important results. The electric currents before and after the bioloads can be different and the reductance at the disconnection from the power source means that a lot of Gibb's free energy can be remained in the bioloads during the electrons' flow. ABRR was made by Korean Maker, MADISON INCORPORATION in Seoul.

4. Conclusion

①Conventional electric potential was defined by the Coulomb attraction energy between charges in the conventional physics.
②New electric potential is defined as Gibb's free energy per charge in the conductor, which is different from the conventional concept in view of energy conversion needed.
③It needs new method for measuring the integral electric power, in which the currents and voltages before and after the loads are to be measured.
④An experimental example (bioloads) showed very well the different currents before and after the loads, which needs the new measuring method.

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