

Modelling and results regarding the bio-electromagnetic field recorded electrographically

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Recording of the image of the radiating biofield of electrostatic nature on the photosensitive film was made by using an electrographic installation, working under high voltage and low intensity conditions (25-30 kV; 3.5 - 10 μ A), ascending slope monoimpulse, condenser with flat plates, specific cabling. The method initiated by J. Narkevicz (1910), rediscovered by Kirlian (1952), developed by F. Dumitrescu and E. Celan (1975), applied in the study of ontogenesis by C. Guja (1981), used in the experiments on the plant behaviour by M. Godeanu (1983), is at present used in electrographic diagnostics of various medical affections (<Fr. Rainer> Anthropological Research Center of the Romanian Academy) and in some special cognitive experiments (USA, Russia, Germany). The film and electromorphous effects that delimit effluviary structures with specific density and distribution are generated by the biological field belonging to the surface and inside of the organism. The almost periodical shape of the envelope of the electrographic biological signals (streamers) that belong to the frontier of the palm surface, allowed the determination of its analytical expression, using the theory of aleatory functions, almost periodical in probability. The electrographic results were put into functional connection with neuronal activity, the electroencephalographic signals also having a periodical envelope curve. In the paper there has been worked out a cybernetic control and regulation diagram of the cerebral waves, using the electrographic-electroencephalographic assembly as well as the medical control unit for cerebral waves by means of luminous signals. The electrographic information was quantified, while the electrographic test was considered an experiment, its results (biological signals) making up an event field with various achievement probabilities. The electrographic informational calculation method was applied to some lots with psycho-neuro-endocrine and cardiovascular diseases and to some lots consisting of aging subjects. The comparison was made with the results obtained with the witness lots, introducing the term of compared informational electrography (CIEg). The investigations were made on the palm surface, considering that it best reflects the bioinformational dynamics of the human individual. One may highlight an electrographic informational law, the results being useful for the prospective prefiguration and diagnosing of various affections occurring in some processes specific of homeostasis. We determined the mathematical law by means of which its elements are generated; one may attach the human being participating values, corresponding to the hydric, mineral, dielectric, semiconducting components. Isomorphism existing between these components and the biofield forms, recorded electrographically, were highlighted.

Principles, methods, results:

Modelling and informational processing of the bioelectromagnetic field recorded electrographically; the control and regulation cybernetic diagram of the cerebral waves having the electrographic assembly recorded.

- The analytical form of the envelope of the electrographic signals (streamers) considered for frontier (Γ) belonging to the palm surface, was obtained by using the almost periodical functions in probability:

$$\varphi^{(j)}(t) = A_{\varphi}^{(j)} + \sum (B_{\varphi}^{(j)}(v) \cos vt + C_{\varphi}^{(j)}(v) \sin vt) \quad (1) \text{ for which}$$

$$\left. \begin{aligned} A_{\varphi}^{(j)} &= (\sum \sum x_{i,k}^{(j)}) / p \cdot q \\ B_{\varphi}^{(j)}(v) &= 2 \cdot (\sum \sum x_{i,k}^{(j)} \cos vt_i) / p \cdot q \\ C_{\varphi}^{(j)}(v) &= 2 \cdot (\sum \sum x_{i,k}^{(j)} \sin vt_i) / p \cdot q \end{aligned} \right| \quad (2)$$

j-component element of the investigated region (palm surface)

i-point of division of element $j \in \{1, 2, 3, 4, 5\}$

p–element length j [mm]
q–number of electrographically investigated subjects, in the same biofunctional class
k– order number of the investigated subject, k=1,2,...,q
 $x_{i,k}^{(j)}$ –dimension of a streamer recorded on the frontier (Γ)of the palm surface
 t_i –division point of element j
t– current coordinate

Note: In sum Σ in (1) summing index is $v(v=1,2,\dots,n)$, and sum $\Sigma \Sigma$ in (2) summing indexes are i and k(i=1,2,...,p; k= 1,2,... q).

It was considered that overlapping the variable biofield forms over the constant ones may be modelled by approximating the envelope by means of the aleatory functions, almost periodical in probability. By means of (EG) experiments it was proved that changes of the emotional states are accompanied by changes of electron agglomeration at the level of cutaneous contact areas. Modifications of the electrographic imprints were found with the subjects in relaxed states, comparatively with the subjects in excited psychic condition (energetic dissipation of the biofield). In the common emotional state the streamer type biological signals have a regular distribution all over the palm contour; under stress the area delimiting the anatomic frontier of the palm lacks streamers almost compl

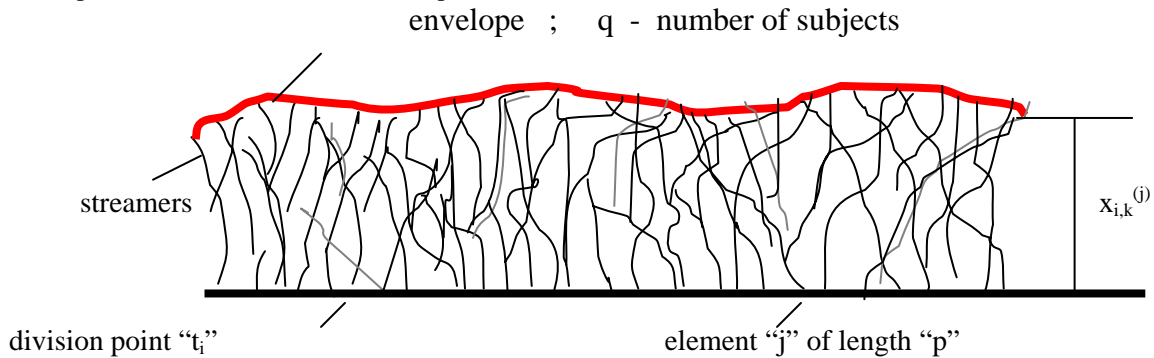


Fig.1 The graphical form of streamers envelope belonging to the frontier of the palm surface

- The cerebral field characterized by potential Φ , depending on the observation point, has the expression:

$\Phi = \Sigma \Sigma \alpha_m(f, \delta) e^{j(m\psi - 2\pi f\tau)} J_m((2\pi f j / \delta)^{0.5} r)$ (3) (International Journal of Theoretical Physics, 1975, pp.1-9), in which: J_m – Bessel function of order m; σ - electric conductivity; $f = \omega / 2\pi$ -frequency; C –capacity of neuronal environment; ω -pulsation; τ -time(μ s); $\delta = \sigma / C$ -diffusion parameter ; α_m –EEG coefficients; (r, ψ, z) –cylindrical coordinates; $j = (-1)^{0.5} \in C$; EEG-electroencephalogram; EG-electrography

The variation of cerebral potential in infinitesimal time intervals has the expression $\partial\Phi/\partial\tau$, differential form $\varphi^{(j)}(t) = F(\partial\Phi/\partial\tau, k)_{\tau=\tau_0}$ determining dependence of radiating biofield on cerebral potential at moment $\tau = \tau_0$. $\varphi^{(j)}(t) = A_\varphi^{(j)} + \Sigma(B_\varphi^{(j)}(v)\cos vt + C_\varphi^{(j)}(v)\sin vt) = F(\Sigma \Sigma \alpha_m(f, \delta) e^{j(m\psi - 2\pi f\tau)} J_m((2\pi f j / \delta)^{0.5} r) (-2\pi f))$ (4)
The fact that the cerebral potential and the emotional state may be placed in correspondence with the modifications of the palm imprint recorded electrographically led to generating a cybernetic diagram (EG) for electrographic control, electroencephalographic control (EEG) and medical adjustment of the cerebral waves ($\alpha, \beta, \delta, \theta$) by means of luminous impulses. The input/output elements are correlated with scalars $\varphi^{(j)}(t)$ and $\Phi(\tau)$, the medical adjustment-therapy unit being described in <Proceedings of the International Conference on Medical and Biological Engineer, Ottawa, 1986>.

Selective bibliography:

[1]S.Baiculescu, Neurophysiological aspects mathematically modelled throuought ANs-MBt theory, 2-5 September 2002, Nitra, Slovakia, The 7thInternational Congress of Cybernetics, Computers Sciences and System Theory, Die kibernetik in die theorie und praxis, pag.267-280.