


Electrodynamics of the Brain

Khursheed Athar Siddiqui and Syed Arif Kamal* 

Department of Physics, University of Karachi, Karachi, Pakistan; *profdrakamal@gmail.com

*Homepage: <https://www.ngds-ku.org/kamal> — corresponding author

Global-electrocortical activity of the human brain (Fig. 1) was modeled as a system of damped-coupled-harmonic oscillators. The equations were written in a covariant form using tensorial



Fig. 1. The human brain

notation (Fig. 2). Generalized coupling dependent on both the electrical potentials and their rates

$$\begin{aligned}\phi_i &\rightarrow A_i = \lambda_i \phi_i, \\ \mathcal{D}_i(\tau) &\rightarrow \Delta_i(\tau) = \lambda_i \mathcal{D}_i(\tau) \tilde{\lambda}_i, \\ \mathcal{N}_i(\tau) &\rightarrow \eta_i(\tau) = \lambda_i \mathcal{N}_i(\tau) \tilde{\lambda}_i, \\ \mathcal{K}_i^j(\tau) &\rightarrow \tilde{\mathcal{K}}_i^j(\tau) = \lambda_i \mathcal{K}_i^j(\tau) \tilde{\lambda}_i.\end{aligned}$$

Fig. 2. Transformation of the parameters

of change was introduced in the covariant model. Perturbation effects and physiological implications were discussed[§].

Keywords: Covariant formulation • Driven-harmonic oscillator • EEG • Neuron • Neuroscience • Synapse • Tensorial notation

Web address of this document: <https://www.ngds-ku.org/Presentations/Electrodynamics.pdf>

[§]An enhancement of the covariant-generalized-coupling model:

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