



Assessing the Current Densities Induced by E&M Low Frequency Fields in Human Body

Alexandru Salceanu

Department of Electrical Measurements and Electrotechnical Materials

Technical University „Gheorghe Asachi” of Iasi, Romania

asalcean@tuiasi.ro

Abstract:

The Directive 2013/35/EU of The European Parliament and Council entered into force on the 1-st July 2016. It is focused on the minimum health and safety requirements regarding the exposure of workers to electromagnetic fields. The issue is up-to-date and challenging, a plain argument being the dynamic of the European legislation in the field: the presently repealed Directive 2004/40/EC had been elaborated just only 9 years before.

There is a large concern between employers, stakeholders and authorities regarding the effective application of the associated settlements. How could be decided that we have to deal or not with a dangerous situation? For the very beginning, it is the responsibility of the employer, but in the second phase, a state protection authority should check the orderliness and the conformation to the imposed limits. There are high expectations regarding quasi-accurate but financially affordable methods for exposure evaluation.

There are many international agencies and organizations involved in establishing exposure restrictions on scientific basis: World Health Organization (WHO), International Commission on Non-Ionizing Radiation Protection (ICNIRP), International Agency for Research on Cancer (IARC) and Institute of Electrical and Electronics Engineers (IEEE). Obviously, the 2013/35 Directive is not concentrated on the long-term effects of the existence of electromagnetic fields. Even if direct biophysical effects and indirect effects have been studied and demonstrated, there is not a generally accepted, scientifically proved relationship between normally encountered electromagnetic fields (EMF) and human health risks. The cautious approach should be that is better to prevent than to cure and, undoubtedly, all the workers in the European Union must be protected against the possible risks arising from different time varying electromagnetic fields.

In this presentation we provide an overview of the main methods for assessing the answer of the human body versus the aggression performed by the low frequency electric and magnetic fields on living; it is mainly about axial and respective circular current densities induced inside the body. It will be a talk on limits, advantages and accuracies of the direct measurements, phantom approaches and modeling and simulations based on computational electromagnetic, about the various methods and techniques implemented by dedicated software aiming to approximate solutions for Maxwell's partial differential equations.