Assessment of electromagnetic environment risk for human body

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Questions about electromagnetic field influence on health have not been definitely answered. Negative thermal effect due to electromagnetic energy absorption in human tissue has been demonstrated at present time. Electromagnetic field levels which can cause health threat by thermal effect can occur in case of accident, in case persons are irradiated by power radiated sources as power transmitters, jamming equipments, radars and electromagnetic (RF) weapons. People can be unwillingly affected by high power electromagnetic field during working on RF equipments in case of safety rules break.

Subject of presented project are possibilities of assessment of electromagnetic environment risk considering electromagnetic irradiation in frequency range 100 kHz – 10 GHz. Specific absorption rate (SAR) in human body is a typical electromagnetic quantity for threat level assessment in this frequency range. The aim of project is verification of possibilities and practical use of electromagnetic excitation assessment with reference to thermal effect in biologic tissue considering skin depth depended on frequency. Because of humane reasons and possible human tissue and body affection it is not possible to make experiments on human body. Numerical method use was chosen as a good alternative for real experiment. As suitable numerical method is considered Finite Difference Time Domain (FDTD) method (for example software SEMCAD X). 3D structural model of the whole human body (phantom) WHPWB-1 will be used for numerical method FDTD. It is necessary to verify validity of numerical model by comparison of results from simulation and results from measurement for the same conditions (the same modeled and really electromagnetic environment). In case Specific Absorption Ratio levels absorbed in human tissue are lower than limits given according to ICNIRP (International Commission on Non-Ionizing Radiation Protection) it is possible to consider investigated electromagnetic environment as a safe. First results of comparison analysis of data from physical electromagnetic field distribution measurement and data gained from numerical simulation will be presented in this paper.

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