

Exposure Assessment on Short Pulse EM Fields

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For many years now the general public has been concerned about possible health effects of an exposure to electromagnetic fields. High levels of radio frequency (RF) electromagnetic fields are known to cause physical effects on the human body. Electromagnetic fields with frequencies of military and civil communication-, detection- (e.g. radar) and consumer electronic devices are known to cause health effects by heating up the body tissue. Significant work has been accomplished in the last decade by developing legal regulations and guidelines to limit the risk of an exposure to RF electromagnetic fields. The guidelines as well as the related standards are setting limits which are based on the ANSI/IEEE C95.1 “Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz” for the US and ICNIRP Guidelines “Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300 GHz)” for Europe and other regions. Even though all kinds of electromagnetic waveforms must comply with the regulations and health and safety guidelines, the documents mainly focus on continuous wave (cw) and modulated cw signals. There are no special guidelines for operators of short-pulse radiating systems, like electromagnetic pulse (EMP) and ultrawideband (UWB) simulators, how to calculate an appropriate exposure assessment.

The goal of this talk is to present and discuss a method for the calculation of an exposure assessment for short pulse electromagnetic fields. After a short review of international and national regulations and guidelines the special characteristics of transient electromagnetic fields and their biological effects will be discussed with respect to protection objectives and basic restrictions (exposure limits). A modified exposure assessment procedure, which deals with the characteristics of transient electromagnetic fields, will be presented. The applicability of the presented method will be demonstrated exemplary by the risk assessment for the mobile German EMP and UWB simulator.