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POSTER ☐

PLATFORM PRESENTATION ☒

Evaluation and characterization of fetal exposures to low frequency magnetic fields generated by laptop computers

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Portable – or "laptop" – computers (LCs) are widely and increasingly used all over the world. Since LCs are often used in tight contact with the body even by pregnant women, fetal exposures to low frequency magnetic fields generated by these units can indeed occur, as these fields are not shielded by the mother's tissues. LC emissions are usually characterized by complex waveforms and are often generated by the main AC power supply (when connected) and by the display power supply sub-systems.
In the present study, low frequency magnetic field emissions were measured for a set of four models of portable computers. For each of them, the magnetic flux density was characterized in terms not just of field amplitude, but also of the so called "weighted peak" (WP) index, introduced in the 2003 ICNIRP Statement on complex waveforms and confirmed in the 2010 ICNIRP Guidelines for low frequency fields. For the model of LC presenting the higher emission, a deeper analysis was also carried out, using numerical dosimetry techniques to calculate internal quantities (current density and in-situ electric field) with reference to a digital body model of a pregnant woman. Since internal quantities have complex waveforms too, the concept of WP index was extended to them, considering the ICNIRP basic restrictions defined in the 1998 Guidelines for the current density and in the 2010 Guidelines for the in-situ electric field. Induced quantities and WP indexes were computed using an appropriate original formulation of the well known *Scalar Potential Finite Difference* (SPFD) numerical method for electromagnetic dosimetry in quasi-static conditions.
In this work it is shown how, with some approximations, it is possible to assess exposures taking into account the complete waveforms of the pertinent induced quantities, rather than just using some summarizing parameters like RMS or peak values, which are poorly descriptive when having to deal with complex waveforms. On the other hand, it is also shown how the weighted peak approach applied to basic restrictions represents a convenient way to verify compliance to exposure standards and to express the exposure characteristics with a single parameter even from a dosimetric point of view.