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ENVIRONMENTAL IMPACTS OF THE ELECTROMAGNETIC FIELD LEVELS NEAR OVERHEAD TRANSMISSION LINES

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Abstract

According to the contemporary research, there are some indications that extremely low frequency electromagnetic fields, such as those originating from electric power transmission lines, can have some influence on human health. This work involved the computation of the magnetic field generated by one typical 110 kV power transmission line in Serbia by applying artificial intelligence techniques that, as previous investigations confirmed, allow accurate assessment. At first, the investigation was aimed at defining area in vicinity of power lines in which there was a potential health risk for people who stayed longer in this zone. Then, the focus of further research was to predict and analyze the magnetic field levels inside imaginary home located within defined zone, at different specific heights from the ground, and to imply on their possible influence on the inhabited environment.

Key words: artificial intelligence techniques, magnetic field, power transmission line

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1. Introduction

The electric power system produces extremely low frequency electric and magnetic fields. In recent years, concern about harmful effects has been raised and it has been focused on the effects of magnetic rather than those of electric field (childhood leukaemia in particular). The first report suggesting an association between residential electric and magnetic fields and childhood leukaemia was published in 1979 (Wertheimer and Leeper, 1979). Since 1979 there has been concern that these fields may be associated with cancer, and this has been discussed in many studies.

Nowadays most countries find the scientific basis for the recommended levels of exposure in the ICNIRP guidelines and Council Recommendation (ICNIRP, 1999, 2010; Council Recommendation, 1999). Even stricter legislation has been implemented by some countries, e.g. Switzerland, Italy, and Belgium.

Two pooled analyses (Ahlbom, 2000; Greenland, 2000) seem to be of high significance for the topic. Based on these two pooled analyses and some other epidemiological studies with similar results, International Agency for Research on Cancer (IARC) has classified extremely-low frequency magnetic field (ELF-MF) as a possible human carcinogen. An ELF-MF exposure greater than 0.4 μ T is regarded as a possible cause of childhood leukemia (WHO/IARC, 2002).

Scientific studies of the magnetic field harmful influence in vicinity of power lines are being continued, and in recent years they have developed into modern epidemiological studies (Draper et al., 2005; Swanson, 2008), conducted in various parts of the world (Li et al., 2007; Marcilio et al., 2009). The latest pool analysis (Kheifets et al., 2010) is in line with previous pooled analyses showing an association between magnetic fields and childhood leukaemia, but the association is somewhat weaker.

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