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## MITIGATION OF POWER FREQUENCY MAGNETIC FIELD NEARBY POWER LINES USING RECTANGULAR FRAMES

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### Abstract

The paper outlines a technique to mitigate the power frequency magnetic field produced in its vicinity by the transport and distribution power lines. The technique consists in introduction below the line conductors of a passive loop of rectangular shape. Due to the induced currents in the rectangular frame, the total magnetic field below this structure is significantly reduced. The method's efficiency depends by the line conductor's configuration and also by the dimensions of the frame. The efficiency of the method can be improved by adding external capacitances to the passive loop. These external capacitances can lead to series resonance effect in the loop equivalent circuit that increases the value of the induced current flowing in the frame but they also enhance the induced current phase. Thus, in the first part of the paper the theoretical background is emphasized.

Starting from Maxwell laws the expressions of the induced electromotive force in the frame structure and the corresponding current flowing through it are determined. Then the magnetic field computation formulae are outlined. Using these formulae one can compute the magnetic field values in points located below the power line, emphasizing the effect of the presence or not of the protective frame. In the second part of the paper two conductor line arrangements are used in order to proof the efficiency of the mitigation technique proposed. The improvement in the field mitigation by the usage of an external capacitance is also made.

*Key words:* magnetic field, mitigation, power lines, rectangular frames

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