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# Mitigation of the Electric and Magnetic Fields of 500-kV Overhead Transmission Lines

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**ABSTRACT** The electric and magnetic fields of overhead high voltage transmission lines are still a critical problem for new construction because of their biological effects on the human body. This issue has been a subject of scientific interest and public concern for the risk of the electric and magnetic fields on living organisms. Accordingly, the overhead transmission lines are considered a source of such this risk due to their high electric and magnetic fields in the populated areas. Because of the recent concerns that electric besides magnetic fields, generated by overhead transmission lines, electric power researchers have been trying to find effective methods for the mitigation of the electrical and magnetic fields to be in the range of acceptable limits. Researchers have been trying to find transmission line geometries that will reduce these electric and magnetic fields. Therefore, in this article two novel methods of reducing the electric and magnetic fields are discussed, one is to change the position of the center phase to optimize the delta configuration and the other is to use more than two shielding wires with calculating the currents in these wires. The obtained results of the two proposed methods are compared with the electric as well as magnetic fields, and the right-of-way values of the present conventional configuration. Additionally, this article presents a case study carried out on an Egyptian 500 kV high voltage overhead transmission line for the mitigation of magnetic and electric field intensities.

**INDEX TERMS** Mitigation of the electrical and magnetic fields, numerical methods, biological effects of electromagnetic, overhead power transmission lines.

## I. INTRODUCTION

The use of electrical energy transmission lines in populated areas causes numerous issues, that's due to the high value of the electric besides magnetic fields on the ground level

living organisms [2]. One of the main key elements that determine the selection of transmission line right of way (ROW) is that the high impact of electric and magnetic fields. Power line ROW, in general, can be defined as the safe path