Name of Candidate: Eslam Mohamed Ahmed

Degree: Doctor of philosophy (PhD)

Department: Engineering Mathematics and physics Department

Title of Thesis: Mitigation of Both Electric and Magnetic Fields near Overhead Power Transmission Lines using Reactive Compensation

Supervisors: 1- Prof .Dr. Hazem Ali Attia

2- Assoic.prof.Dr. Khaled Hosny Ibrahim

Approval: --/--/2024

ABSTRACT

Electromagnetic fields (EMFs) generated by overhead transmission lines can have noticeable impacts on the surrounding environment. High-intensity EMFs can have potential health effects on humans living or working near transmission lines. Mitigating these EMFs is crucial to ensure the safety and well-being of individuals residing near these power lines. EMFs mitigation could be accomplished through either electrical compensation or mechanical line rearrangement. In the present research, the passive reactive compensation method is combined with mechanical rearrangement of power conductors to optimize the resultant EMFs above ground level as minimum as possible. Genetic Algorithm (GA) is used to achieve this objective by encoding both of the conductor positions and proposed reactive elements for each phase as genes. Results show that Electrical compensation improves the mechanical rearrangement method by about 33% (total reduction with mechanical compensation only about 34% is increased to more than 52% with electromechanical compensation). At last, different fitness functions are utilized to mitigate both electric and magnetic field. The results show about 47% reduction in both electric and magnetic fields.