جـــامعة الفـــيوم
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Title of Thesis: Modeling Of Harmonics Penetration, Effects And Compensation In Electrical Networks Considering The Time Variation Of Loads

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ABSTRACT

Distortion in electric power systems takes place as a direct result of nonlinear nature of electric power system. Beside the problem of harmonic distortion itself, the probabilistic nature of harmonics and system parameters comes to have a considerable impact on the compensator design. Passive compensator sometimes fails to implement its function when the harmonic characteristics widely change.

In this work, studying the effects of the probabilistic nature of harmonics and system parameters (load impedance and harmonic currents) on the system performance and economics is introduced. Designing a multi-step inductive-capacitive compensator based on performance and economic criteria and constraints is also introduced. Finally designing an active power filter based on a new processing algorithm is deduced from the multi-step inductive-capacitive model as the step is too small to be implemented. This thesis uses Genetic Algorithm as an optimization tool in addition to numerical iterative methods.

The contribution of the proposed algorithms is demonstrated in examples taken from previous publications. Finally, simulated results show the following:

- The fixed Inductive-capacitive compensator is not sufficient to ensure satisfactory results in case of probabilistic condition with high variance.
- The multi-step inductive-capacitive compensator provides a considerable improvement in the performance and economics in case of probabilistic condition.
- The new design of active power filter is more economic and robust since no algorithm for harmonic subtraction is needed.

The summary not more than 500 words