ENHANCEMENT OF DISTRIBUTION SYSTEMS PERFORMANCE USING MODERN OPTIMIZATION TECHNIQUES

B. Sc. Project

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##### ABSTRACT

The major loads are connected to the network through the distribution systems. Therefore, the quality of the service is based on the continuity of power and maintaining the supply voltage within certain limits with specified frequency. Due to the rapid spread in the loads, the long distance of radial structure and the high R/X ratio of lines, the power loss reduction and voltage profile improvement are the challenge. To solve these problems, the distributed generations (DGs) and shunt capacitors are installed on the radial feeders for active and reactive power injections. Therefore, the optimal locations and sizes of DGs and capacitors in distribution systems can be formulated as a constrained optimization problem. In order to solve this problem, the optimization techniques are applied

This project presents a procedure to determine the optimal placement of DGs and capacitors with an objective of power loss minimization or total voltage deviation minimization. The Archimedes Optimization Algorithm (AOA) is introduced to find the optimal locations and sizes of DGS and Capacitors considering the minimization of total power loss or TVD as objective function, while the security and operational constraints are fully achieved. The backward/forward sweep (BFS) algorithm is introduced for the load flow calculations. The proposed procedure is applied on 34-bus standard radial distribution system and East Delta Network (EDN) distribution system as a part of the Unified Egyptian Network (UEN) in order to solve the optimal DGs and capacitors placement problem. The obtained results are compared with other methods. Simulation results show the capability of the proposed procedure to find the optimal solution for significant minimization in the objective function with more accuracy and efficiency.

##### Table of contents

[Acknowledgement 2](#_Toc107518672)

[ABSTRACT 3](#_Toc107518673)

[Table of contents 4](#_Toc107518674)

[Table of symbols 7](#_Toc107518675)

[1. Introduction 2](#_Toc107518676)

[1.1. General 2](#_Toc107518677)

[1.2. Project Contributions 6](#_Toc107518678)

[1.3. Scope of the Project 6](#_Toc107518679)

[2. Distributed Generation and Capacitor Technologies 9](#_Toc107518680)

[2.1. Introduction 9](#_Toc107518681)

[*2.2.* Distributed Generations (DGs) 9](#_Toc107518682)

[2.2.1. Definition of DG 10](#_Toc107518683)

[2.2.2. Types of DGs 11](#_Toc107518684)

[2.2.3. Applications of DGs 12](#_Toc107518685)

[2.3. Capacitor Banks 13](#_Toc107518686)

[2.3.1. Fixed versus switched capacitor banks 14](#_Toc107518687)

[2.3.2. Benefits of capacitor banks 14](#_Toc107518688)

[3. Problem Formulation 17](#_Toc107518689)

[3.1. Introduction 17](#_Toc107518690)

[3.2. Problem Formulation 18](#_Toc107518691)

[3.2.1. Objective functions 18](#_Toc107518692)

[3.2.1.1. Total power loss minimization 18](#_Toc107518693)

[3.2.2. System constraints 18](#_Toc107518694)

[3.2.2.1. Equality constraint 19](#_Toc107518695)

[3.2.2.2. Inequality constraints 19](#_Toc107518696)

[4. Archimedes Optimization Algorithm (AOA) 23](#_Toc107518697)

[4.1. Modern Optimization Methods 23](#_Toc107518698)

[4.2. Archimedes Optimization Algorithm 23](#_Toc107518699)

[4.2.1. Introduction 23](#_Toc107518700)

[4.2.2. AOA Theory 23](#_Toc107518701)

[4.2.3. Algorithmic steps 24](#_Toc107518702)

[5. APPLICATIONS AND RESULTS 29](#_Toc107518703)

[5.1. Test Systems 29](#_Toc107518704)

[5.2. Case Studies 29](#_Toc107518705)

[5.3. Results 30](#_Toc107518706)

[5.3.1. Total power losss minimization 30](#_Toc107518707)

[5.3.1.1. 34-bus radial distribution system 30](#_Toc107518708)

[5.3.1.2. EDN radial distribution system 36](#_Toc107518709)

[5.3.2. TVD minimization 42](#_Toc107518710)

[5.3.2.1. 34-bus radial distribution system 42](#_Toc107518711)

[5.3.2.2. EDN radial distribution system 47](#_Toc107518712)

[6. CONCLUSIONS 54](#_Toc107518713)

[7. REFERENCES 56](#_Toc107518714)

[8. Appendix A 59](#_Toc107518715)

[9. Appendix B 62](#_Toc107518716)

##### Table of figures

[Figure ‎5‑1 convergence curve for IEEE-34 network (objective function: Total power loss minimization) 35](#_Toc107518761)

[Figure ‎5‑2 convergence curve for IEEE-34 network (objective function: Total power loss minimization) 35](#_Toc107518762)

[Figure ‎5‑3 voltage profile for IEEE-34 network (objective function: Total power loss minimization) 36](#_Toc107518763)

[Figure ‎5‑4 Voltage profile for EDN system (objective function: Total power loss minimization) 41](#_Toc107518764)

[Figure ‎5‑5 convergence curve for EDN system (objective function: Total power loss minimization) 41](#_Toc107518765)

[Figure ‎5‑6 convergence curve for EDN system (objective function: Total power loss minimization) 42](#_Toc107518766)

[Figure ‎5‑7 convergence curve for IEEE-34 system (objective function: TVD minimization) 46](#_Toc107518767)

[Figure ‎5‑8 convergence curve for IEEE-34 system (objective function: TVD minimization) 46](#_Toc107518768)

[Figure ‎5‑9 Voltage profile for IEEE-34 system (objective function: TVD minimization) 47](#_Toc107518769)

[Figure ‎5‑10 Voltage profile for EDN system (objective function TVD minimization) 50](#_Toc107518770)

[Figure ‎5‑11 convergence curve for EDN system (objective function TVD minimization) 51](#_Toc107518771)

[Figure ‎5‑12 convergence curve for EDN system (objective function TVD minimization) 52](#_Toc107518772)

##### Table of tables

[Table ‎5‑1 A comparison between the power loss minimization using the proposed procedure with other methods using only the DGs at unity power factor (case 1) for 34-bus test system 30](#_Toc107518881)

[Table ‎5‑2 A comparison between the power loss minimization using the proposed procedure with other methods using only the DGs at 0.9 power factor (case 2) for 34-bus test system 31](#_Toc107518882)

[Table ‎5‑3 A comparison between the power loss minimization using the proposed procedure with other methods using only the capacitors (case 3) for 34-bus test system 32](#_Toc107518883)

[Table ‎5‑4 A comparison between the power loss minimization using the proposed procedure with other methods using DGs at unity power factor and capacitors (case 4 ) for 34-bus test system 32](#_Toc107518884)

[Table ‎5‑5 A comparison between the power loss minimization using the proposed procedure with other methods using DGs at .9 power factor and capacitors (case 5) for 34-bus test system 33](#_Toc107518885)

[Table ‎5‑6 Optimal locations and sizes of DGs at unity power factor using the proposed method for EDN system (case 1) 36](#_Toc107518886)

[Table ‎5‑7 Optimal locations and sizes of DGs at 0.9 power factor using the proposed method for EDN system (case 2) 37](#_Toc107518887)

[Table ‎5‑8 Optimal locations and sizes of capacitors using the proposed method for EDN system (case 3) 38](#_Toc107518888)

[Table ‎5‑9 A comparison between the power loss minimization using the proposed procedure with other methods using DGs at unity power factor and capacitors (case 4 ) for EDN system 39](#_Toc107518889)

[Table ‎5‑10 Table ‎5 10 A comparison between the power loss minimization using the proposed procedure with other methods using DGs at .9 power factor and capacitors (case 5) for EDN system 39](#_Toc107518890)

[Table ‎5‑11 A comparison between the TVD minimization using the proposed procedure with other methods using only the DGs at unity power factor (case 1) for 34-bus test system 42](#_Toc107518891)

[Table ‎5‑12 A comparison between TVD minimization using the proposed procedure with other methods using only the DGs at 0.9 power factor (case 2) for 34-bus test system 43](#_Toc107518892)

[Table ‎5‑13 A comparison between TVD minimization using the proposed procedure with other methods using only the capacitors (case 3) for 34-bus test system 44](#_Toc107518893)

[Table ‎5‑14 A comparison between the power loss minimization using the proposed procedure with other methods using DGs at unity power factor and capacitors (case 4 ) for 34-bus test system 44](#_Toc107518894)

[Table ‎5‑15 A comparison between the power loss minimization using the proposed procedure with other methods using DGs at .9 power factor and capacitors (case 5) for 34-bus test system 45](#_Toc107518895)

[Table ‎5‑16 Optimal locations and sizes of DGs at unity power factor to reduce TVD using the proposed method for EDN system (case 1) 47](#_Toc107518896)

[Table ‎5‑17 Optimal locations and sizes of DGs at 0.9 power factor using the proposed method for EDN system (case 2) 48](#_Toc107518897)

[Table ‎5‑18 Optimal locations and sizes of capacitors using the proposed method for EDN system (case 3) 48](#_Toc107518898)

[Table ‎5‑19 A comparison between the TVD minimization using the proposed procedure with other methods using DGs at unity power factor and capacitors (case 4 ) for EDN system 49](#_Toc107518899)

[Table ‎5‑20 A comparison between the power loss minimization using the proposed procedure with other methods using DGs at .9 power factor and capacitors (case 5) for EDN system 49](#_Toc107518900)

Chapter 2

Chapter 3

Chapter 4

Chapter 5

Chapter 6

References

&

appendices

Fig. B.1 Flow chart of backward/forward sweep load flow