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***of***

**MASTER OF ENGINEERING**

**IN**

**POWER SYSTEMS**



**DEPARTMENT OF ELECTRICAL ENGINEERING**

**FACULTY OF ENGINEERING AND TECHNOLOGY**

**ANNAMALAI UNIVERSITY
ANNAMALAINAGAR – 608 002**

**TAMIL NADU, INDIA**

**2020**

**ANNAMALAI UNIVERSITY**



**Department of Electrical Engineering**

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**திட்ட சுருக்கம்**

TABLE OF CONTENTS

|  |  |  |
| --- | --- | --- |
| **CHAPTER No** | **TITLE** | **PAGE NO.** |
|  | **ACKNOWLEDGEMENT** | **ii** |
|  | **ABSTRACT** | **iii** |
|  | **திட்ட சுருக்கம்** | **iv** |
|  | **LIST OF FIGURES** | **vii** |
|  | **LIST OF TABLES** | **viii** |
|  | **NOMENCLATURE** | **ix** |
|  |  |  |
| **1** | **INTRODUCTION** | **1** |
|  | 1.1 | General | **1** |
|  | 1.2 | Literature Survey / Existing Systems | 2 |
|  | 1.2 | Motivation | 3 |
|  | 1.3 | Objectives of the Project | 3 |
|  | 1.4 | Work Done / Proposed Work | 4 |
|  | 1.5 | Organization of the Report | 4 |
| **2** | **PROBLEM FORMULATION** | **5** |
|  | 2.1 | Mathematical Model/ Proposed Model | 5 |
|  | 2.2 | Constraints | 6 |
|  | 2.3 | Summary | 6 |
| **3** | **IMPLEMENTATION OF THE PROPOSED WORK** | **7** |
|  | 3.1 | General | 7 |
|  | 3.2 | Need of Optimization Tool | 10 |
|  | 3.3 | Execution of proposed work with optimization Tool | 14 |
|  | 3.4 | Summary | 15 |
| **4** | **NUMERICAL RESULTS AND DISCUSSION / EXPERIMENTAL SET UP** |  |
|  | 4.1 | General |  |
|  | 4.2 | Results |  |
|  | 4.3 | Certain Observations from the Results |  |
|  | 4.4 | Summary |  |
| **5** | **CONCLUSIONS** |  |
|  | 5.1 | Summary of the Work |  |
|  | 5.2 | Contributions |  |
|  | 5.3 | Future Work |  |
|  | **REFERENCES** |  |
|  | **APPENDIX** |  |

LIST OF FIGURES

|  |  |  |
| --- | --- | --- |
| **FIGURE. NO.** | **TITLE** | **PAGE NO.** |
| 3.1 | Equivalent Circuit of Electrical Machines | 15 |
| 3.2 | Approximated Efficient Model | 18 |
| 3.3 | Block Diagram Representation of Proposed Model | 20 |
| 3.4 | Flow Chart of the Proposed Method | 25 |
| 5.1 | Diagram of Test Bench  | 28 |
| 5.2 | Performance Curve of the Proposed Model | 31 |
|  |  |  |
|  |  |  |
|  |  |  |

LIST OF TABLES

|  |  |  |
| --- | --- | --- |
| **TABLE NO.** | **TITLE** | **PAGE NO.** |
| 5.1 | Collected Data | 25 |
| 5.2 | Results of Proposed method | 30 |
| 5.3 | Optimal Performances | 35 |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

NOMENCLATURE

|  |
| --- |
| **ABBREVIATIONS** |
| ABC | Artificial Bee Colony |
| EM | Existing method |
| LP | Linear Programming |
| PM | Proposed Method |
| PSO | Particle Swarm Optimization |
| TOC | Total Operating Cost |
|  |  |
| **ENGLISH SYMBOLS** |
| [C] | branch to node matrix |
| nb | number of buses |
|  | magnitude of current flow from node-k to node-m |
|  and  | resistance and reactance of a branch connected between nodes-k and m |
|  |  |
|  |  |
| **GREEK SYMBOLS** |
|  | power factor angle of the power at the receiving end of feeder- |
|  | change in  |
|  |  |
|  |  |

# CHAPTER 1

# INTRODUCTION

### 1.1 GENERAL

(Times New Roman -12 ) DNs, comprising of a substation, primary/ main feeders and lateral distributors, links the high voltage transmission network with the low voltage consumers. The substation receives power from the transmission system at high voltages (110-400 kV) and transports the power at medium voltages (11-33 kV) through the main feeder to the major load centres. ...........

### 1.2 LITERATURE SURVEY / EXISTING WORK

 In the last few decades, researchers have formulated the NR, capacitor placement, DGP, and LS as optimization problems with multiple objectives of PL reduction, voltage profile (VP) improvement and VS enhancement and studied the performances. As there are no avenues to find the global best optimal solution for these complex optimization problems, there is always a need for building new methodologies for these problems. This requirement motivates the researchers to work on these problems.

### 1.3 MOTIVATION

 COVID-19 has been spreading like anything around the world since Dec. 2019. It causes failures of multiple organs, especially lungs and leads to death of several infected patients. By Mar. 2020, nearly 2 lakhs peoples have died due to this infection. As there is no proper medicine for this disease, the scientists and the pharmaceutical companies are striving to find vaccines for prevention and medicines for treatment. This objective of the project work to develop a medicine for this infectious disease.

### 1.4 OBJECTIVE OF THE WORK

 A new medicine for treating COVID-19 has been developed in this project. The developed medicine has been tested on animals and obtained satisfactory results. ....

### 1.5 ORGANIZATION OF THE REPORT

 A new medicine for treating COVID-19 has been developed in this project. The developed medicine has been tested on animals and obtained satisfactory results. ....

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# CHAPTER 2PROBLEM FORMULATION

### 2.1 MATHEMATICAL MODEL

(Times New Roman -12 ) The research work aims in developing new strategies for optimal reconfiguration, DGP and LS in DNs with a view of improving the orational performances such as PL, VP and VS. This chapter attempts to present the state of art models and methods carried out in these areas. ...........

### 2.2 CONSTRAINTS

 Several methods for network reconfiguration has been suggested in recent years for PL reduction and VP enhancement. A branch-and-bound-type optimization technique for determining the minimum loss configuration has been presented.....

### 2.3 SUMMARY

 In this chapter, various solution methods that include mathematical and nature inspired algorithms suggested in the literature for NR, DGP and LS have been reviewed with their merits and demerits. The need for developing newer solution methods for these dispatch problems has also been enumerated.

**CHAPTER 3**
**PROPOSED ELECTRIC DRIVE**

### 3.1 GENERAL

(Times New Roman -12 ) The performance improvement of Electric Drives can be formulated as an optimization problems with a set of equality and inequality constraints and solved using Genetic Algorithm. This chapter firstly suggests a GA based design procedure and builds a prototype model for Electric drive............

### 3.2 NEED OF OPTIMIZATION TOOL (replace this by appropriate title)

 Several methods for network reconfiguration has been suggested in recent years for PL reduction and VP enhancement. A branch-and-bound-type optimization technique for determining the minimum loss configuration has been presented.....



Fig. 3.1 Life cycle of dragonfly

### 3.3 EXECUTION OF PROPOSED WORK WITH OPTIMIZATION TOOL (replace this by appropriate title)

 Several methods for network reconfiguration has been suggested in recent years for PL reduction and VP enhancement. A branch-and-bound-type optimization technique for determining the minimum loss configuration has been presented.....



Fig. 3.2 Sample Distribution Network



Fig. 3.3 Flow Chart of Symmetrical Short Circuit Analysis

### 3.4 SUMMARY

 In this chapter, a new design procedure for developing an efficient electric drive has been outlined......

# CHAPTER 4RESULTS AND DISCUSSIONS / EXPERIMENTAL SET UP

### 4.1 GENERAL

(Times New Roman -12) The proposed SLSS is tested on the same two standard DNs considered in the previous chapter. The success of this strategy mainly depends on the crucial threshold value for VSI, which is taken as 0.65 for both the networks. It mainly depends on the network configuration and the operating state of the DN. Besides, the proposed SLSS has been tested on four scenarios, as listed in Table 4.1.

Table 4.1 Different Scenarios

|  |  |
| --- | --- |
| **Scenario** | **Modification in the DN** |
| 1 | DN without NR and DGP  |
| 2 | DN after NR and DGP, solved as a composite problem for case-1 |
| 3 | DN after NR and DGP, solved as a composite problem for case-7 |
| 4 | DN after NR and DGP, solved as a composite problem for case-8 |

### 4.2 RESULTS and DISCUSSION (replace this by appropriate title)

 The optimal solutions containing the details of open-switches, DG ratings and node locations for three test cases of 69 node system are given in Table 4.2. .....

Table 4.2 Comparison of performances for 69 node network

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Case | METHOD | PL | TVD | SVSI | TOC | SVM |
| 1 | DFOS | 35.1999 | 0.4036 | 0.9274 | 12637.7694 | 0.9813 |
| EMCP3 | 40.30 | --- | --- | --- | 0.9736 |
| 7 | DFOS | 57.5928 | 0.4927 | 0.8478 | 7632.1161 | 0.9596 |
| GA | 63.1026 | 0.3809 | 0.8406 | 8442.8552 | 0.9575 |
| PSO | 64.4544 | 0.3914 | 0.8400 | 8048.8824 | 0.9574 |
| 8 | DFOS | 45.9322 | 0.6272 | 0.8896 | 6366.8637 | 0.9712 |
| GA | 50.9237 | 0.6294 | 0.8787 | 6485.9699 | 0.9682 |
| PSO | 51.0971 | 0.6669 | 0.8766 | 7099.5483 | 0.9676 |



(a) load current (b) filter current (c) source current (d) source voltage

Fig. 4.1 Waveform for Proposed Method

### 4.3 CERTAIN OBSERVATIONS FROM THE RESULTS

 In this chapter, a new design procedure for developing an efficient electric drive has been outlined......

**4.4 SUMMARY**

The DGs considered in the thesis supply only real power at unity power factor……

# CHAPTER 5CONCLUSIONS

**5.1 SUMMARY OF THE WORK**

 (Times New Roman -12 ) The following conclusions have been drawn based on the methods suggested for distribution systems in this thesis.

**5.2 CONTRIBUTIONS**

 DFO is a robust metaheuristic optimization technique imitated from the static and dynamic swarming activities of dragonflies for solving optimization problems.

* 1. **FUTURE SCOPE**

 The NR and DGP problems have been modelled as optimization problems and blended to form the composite problem. The problem comprise multiple objectives of PL reduction, VP enhancement, VS improvement and TOC minimization besides possessing constraints associated with network radiality, line flow limits and net DG injection limit.

#  REFERENCES (Arrange in Alphabetically)

Author listings in references should be formatted as indicated below.

|  |  |
| --- | --- |
| *1 author* | A. Smith |
| *2 or 3 authors* | A. Smith, B. Jones, and C. Smythe |
| *3 or more authors* | A. Smith *et al*. |

**International / National Journal**

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# APPENDIX

(Times New Roman -12 ) The data for the test system under study are furnished below:

Table A.1 Tie-line data of 33 node distribution system

|  |  |  |  |
| --- | --- | --- | --- |
| Sending end node | Receiving end node | R (per unit) | X (per unit) |
| 21 | 8 | 0.0013 | 0.0013 |
| 9 | 14 | 0.0013 | 0.0013 |
| 12 | 22 | 0.0013 | 0.0013 |
| 18 | 33 | 0.0003 | 0.0003 |
| 25 | 29 | 0.0003 | 0.0003 |



Fig. A.1. IEEE six-bus test system.