OPTIMAL MW AND MVAR CONTROL USING MULTISTAGE ARTIFICIAL IMMUNE SYSTEM TECHNIQUE

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In the name of ALLAH
Most Gracious and Most Merciful

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ABSTRACT

This project presents the development of a technique for an optimal MW and MVAR control in a power system using the Multistage Artificial Immune System (MAIS) Programming technique. The main purpose is to determine the optimal power output of generating unit so as to meet the load demand at the minimum operating cost and minimum generation losses and at the same time to improve the voltage stability while satisfying an accepted system performance under various an operating conditions. The performance of this technique is tested using the IEEE 26 buses Reliability Test System. There are three single objective functions and six multi-objective functions were implemented in this project. The single objective functions are total cost of generation, minimizing the total losses and voltage improvement. For multi-objective functions, the three single objective functions have been considered and combined into six different order of optimization equation. Comparison was made in order to determine the best objective function and technique to be used in solving optimal power dispatch problem. The result shows that the proposed technique is able to determine the optimal schedule for real and reactive power generation in order to meet the objectives.

Keywords:

Real Power (MW), Reactive Power (MVAR), Multistage Artificial Immune System (MAIS), Optimal Power Flow (OPF).

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CHAPTER 1

INTRODUCTION

1.1 Introduction

In large interconnected power system is required to find the optimal real and reactive scheduling of each power plant in such way to minimize the operating cost and losses. The real and reactive power generation scheduling that results in heavy flows tend to incur greater losses, threaten security, and ultimately making certain generation patterns undesirable.

In order to ensure optimal power for economic operation, power generation is schedule base on Optimal Power Flow (OPF) and Economic Dispatch (ED). The main purpose is to determine the optimal power output of generating unit so as to meet the load demand at the minimum operating cost under various an operating conditions.[1]

Power system economical operation consists of two aspects; active power regulation and reactive power dispatch. This forms multi-objective global optimizations problem of a large-scale industrial system. This problem is considered conventionally as two separate problems: P-problem and Q-problem. P-problem is to regulate active power outputs of generators to minimize fuel costs and Q-problem is to control voltages of PV buses and tap settings of the under load tap changing transformers to minimizing the network real power loss and keeping the voltages of all buses in their secure limits.

In recently, many techniques and various mathematical approaches have been employed to solve for real and reactive power dispatch problem. Among the conventional methods that were previously employed are participation factor derived from the critical eigenvector of the Jacobian matrix, Lamda iteration method, the gradient method [2], linear programming based [3], and based optimal power flow program [4].