INITIALIZATION PROCEDURE IN SOLVING OPTIMAL POWER FLOW (OPF) USING ARTIFICIAL IMMUNE SYSTEM (AIS) OPTIMIZATION TECHNIQUE

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ABSTRACT

This project report presents a solution for initializing optimal power flow by using artificial immune system optimization technique. The main consideration in optimal power flow is that the utility strive to minimize its costs and losses while satisfying all of its constraints. By selecting the best of an initial set of control variables from the beginning of the optimization procedure, this method can be work out excellently to achieve the main objective function to minimize instantaneous costs and losses. This paper proposed new approach of selecting initial set of generated and injected reactive power, and also transformer tap changer with less violations of constraint to overwhelm these difficulties. The programmed that has been used in this project is MATLAB, which provides a high level computing language and interactive environment for algorithm development, data visualization, data analysis and numerical analysis. This technique was tested on the IEEE 30 bus reliability test system and results proved that the proposed technique is able to minimize the total costs and total losses of the system.

Keywords

Artificial Immune System (AIS), Optimal Power Flow (OPF), Clonal Selection, Mutation.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

The minimization of total fuel costs and total losses, referred to optimal power flow problem (OPF), is one of the ever-actual power system problems that have been discussed and have improved progressively. It has been an issue of intense power system research to overcome the problems, resulting in many appropriate publications. In particular, under the deregulated environment in the electricity industry in the past few years, the interest in OPF has become even more acquainted.

Therefore, to solve OPF, many optimization techniques have been developed and used by the researcher. A review of selected OPF literature identified several techniques such as nonlinear programming; quadratic programming, Newton-based solution, linear programming, hybrid versions of linear programming and integer programming, and interior point method are used to solve the OPF problems. [1]

The continuous research in this field has led to many new contributions. Some of the previously used approaches have been modified and improved, and some other techniques have been used, such as:

a. Simulated Annealing
b. Genetic Algorithms (GA)
c. Neural Networks
d. Evolutionary Programming
e. Ordinal Optimization Theory