REACTIVE POWER RESERVE MARGIN MANAGEMENT FOR VOLTAGE IMPROVEMENT USING MULTIAGENT IMMUNE EVOLUTIONARY PROGRAMMING OPTIMIZATION TECHNIQUE

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ABSTRACT

Reactive power reserve margin management plays an important role to ensure that the voltage stability of a power system is important and the total power system losses is reduced. This project presents a newly developed optimization technique, termed as Multiagent Immune Evolutionary Programming (MAIEP) optimization technique for solving power reserve margin management utilizing different lattice size to shows the best result. The concept of MAIEP is developed based on the combination of Evolutionary Programming (EP), Multiagent System (MAS) and Artificial Immune System (AIS). As the application shows that after the optimal reactive power rescheduling, the reactive power of the system will be increase and at the same time voltage will improved. Several fitness functions such as total power loss minimization and voltage profile improvement has been explored through the implemented Multiagent Immune Evolutionary Programming optimization technique. The proposed technique was tested with IEEE 30-Bus Test System and the programmed were developed using MATLAB software.

Keywords: Multiagent Immune Evolutionary Programming, voltage improvement, with IEEE 30-Bus Test System, reactive power reserve, MATLAB software.

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CHAPTER 1

INTRODUCTION

1.0 BACKGROUND

In the restructured market background, utilities are required to have independent generation, transmission and distribution business units. The cost recovery of transmission assets is uncertain, and there are no clear incentives for improving the transmission system. As a result, investment in transmission have not kept pace with load growth and investments in generation [1],[2]. Thus, the network is being frequently used under stress and close to its maximum limits. Under these conditions, the decoupling of active power does not hold, and reactive power needs to be explicitly accounted for in system operation and planning.

In power system planning and operation there are many sources of uncertainties. These are related to the load such allocation, quantity, direction of increase/decrease from the forecasted value, the generation in the available capacity and the transmission system (state of devices, thermal constrain, network topology). Thus, reactive power reserves have to be explicitly considered in system planning and operations.

Reactive power reserves can be viewed from the load's perspective and from the generation's perspective. From the load's perspective, the focus in on extra amount of load (active and reactive) that can supplied in a reliable manner. From generation's perspective, the focus is on amount of reserve provided of each generation and its value.