



A NEW HOMOGENEOUS UPFC CONTROL DESIGN USING NEURAL NETWORK MODULE FOR POWER FLOW AND VOLTAGE CONTROL

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Abstract—Voltage control and stability are the most important factor in the daily operation of highly stressed electrical power system networks. A Unified power flow controller (UPFC) is an important power control device, which can control the voltage as well as the active and reactive power flow through the transmission line to which it's connected. The variables of the UPFC must be controlled in agreement with system load conditions for stable operation of the electrical power system. An Artificial neural network (ANN) is an important tool which gives better result in real time. In this paper a artificial neural network(ANN) is design for assessing the output variables of UPFC for different loading scenario of EHV power system.

Keywords—voltagecontroller,UPFC,ANN,Active &Reactive Power

1. INTRODUCTION

The today's deregulation of electrical power systems around the globe may not only provide cheaper electricity and quality service to the customers but also create new technological challenges to the power industries and researchers. In a deregulated atmosphere, the open access to the transmission networks requires adequate Available Transfer Capability (ATC) to insure economic transactions. However, in a privatized electricity market, the major traditional paths to improve ATC, such as rescheduling active power generations, controlling terminal voltage of generators and changing taps of on-load tap changer etc, may not be controlled by the transmission network authority or system operator's. Construction of new transmission lines has always been a better option, but it is subject to tougher environmental restrictions and sometimes social problems too. With widely availability of the fully controlled semiconductor devices such as the Gate Turn-off Thyristor (GTO) and the Insulated Gate Bipolar Transistor (IGBT) and the invention of new topologies i.e. the combination of multiple compensators, the most powerful and versatile group of FACTS (Flexible AC Transmission System) devices, namely composite compensators has been developed. Its representatives include the Unified Power Flow Controller (UPFC) and the Interline Power Flow Controller (IPFC). The latter is the latest generation of FACTS devices. It is well known that heavily loaded lines and buses with relatively low voltages are factors that significantly limit power systems and neural networks have attracted the interest of researchers in various scientific and engineering areas. The main idea of (Artificial Neural Network) ANN logic control is to build a model of a human control expert who is capable of controlling the plant without thinking in terms of a mathematical model and expression. These control rules are translated into the framework of ANN set theory providing a calculus which can simulate the behavior of the control expert. The quality of ANN logic controller can be drastically affected by the choice of membership functions. Thus, methods for tuning ANN logic controllers are necessary.

- The power system is an interconnection of generating units to load centers through high voltage electric transmission lines and in general is mechanically controlled.