

ABSTRACT

Power system scenario in all areas is progressing at faster rate and with the increase in size, capacity, have made the system more complex, leading to reduced reliability. The performance of the interconnected system will be paralysed during dynamic fault condition, which will introduce power quality problems such as power flow control, reactive power compensation, power swing oscillations etc. Furthermore the continuity, reliability and stability of power system will be worsened with the degradation of quality of electric power. In order to ensure better performance and life of the equipment, the power quality demands due importance.

The interface between the system and the equipment is the most common place to mitigate power quality problems. Most of the mitigation techniques are based on the injection of active power thus compensating the loss of active power supplied by the system. The necessity to deliver stable, secured, controlled, economic and high-quality electric power gave a new avenue called the Flexible AC Transmission Systems (FACTS). The Unified Power Flow Controller (UPFC) is one of the FACTS devices which can simultaneously control all the parameters of the power flow. In order to ensure the stability of the system, it is required to implement independent control loops. The conventional controllers exhibit delayed response because of large amount of data to be handled.
In order to achieve the efficient power flow in such circumstances, the power flow controllers are required to be equipped with fast, accurate and optimized controllers. Knowledge based architecture of Artificial Neural Networks (ANN) is used as they are able to learn and store information about system nonlinearities used for modelling and designing intelligent controllers for UPFC. Under dynamic fault conditions, the features of the real power generated consist of high frequency components which may deviate in a large count resulting in lower range accuracy in estimation. If the transients are filtered out using suitable filters, the rotor oscillations can be damped out quickly. Therefore, a wavelet based neuro controller for UPFC is proposed in this thesis, in order to damp out the rotor angle oscillations at faster rate to control the power flow and hence to improve the power quality.