DESIGN AND SIMULATION OF REACTIVE POWER COMPENSATION

ABSTRACT:

During the past two decades, the increase in electrical energy demand has presented higher requirements from the power industry. More power plants, substations, and transmission lines need to be constructed. However, the most commonly used devices in present power grid are the mechanically-controlled circuit breakers. The long switching periods and discrete operation make them difficult to handle the frequently changed loads smoothly and damp out the transient oscillations quickly. In order to compensate these drawbacks, large operational margins and redundancies are maintained to protect the system from dynamic variation and recover from faults. This not only increases the cost and lowers the efficiency, but also increases the complexity of the system and augments the difficulty of operation and control. Severe black-outs happened recently in power grids worldwide and these have revealed that conventional transmission systems are unable to manage the control requirements of the complicated interconnections and variable power flow.

In this THESIS a new active impedance topology, reactive power compensation using active impedance concept is presented employing AC-Choppers is proposed for reactive power compensation(usually employed in railways.) The good behaviour of AC-AC converters in terms of losses respect to other solutions like VSI based STATCOM, make this solution really interesting in high power single phase systems like railway networks. A design method is proposed and simulation results confirm the good working of this low cost and low losses solution.