

MODELING AND ANALYSIS OF CUSTOM POWER DEVICES IN DISTRIBUTION NETWORK TO IMPROVE POWER QUALITY

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ABSTRACT

Electromagnetic transient studies have always played an essential role in the analysis of electrical power systems. They provide priceless information relating to the behavior of the system in the event of different forms of transient phenomena, which can hardly be achieved by other means. This paper aims at developing electromagnetic transient models of custom power equipment, namely Distribution Static Compensator (D-STATCOM), Dynamic Voltage Restorer (DVR) and Solid State Transfer Switch (SSTS) to enhance the reliability and quality of power flows in low voltage distribution networks. A new PWM based control scheme that requires only voltage measurements and no reactive power measurements has been proposed for D-STATCOM and DVR controllers. The transfer of load from a faulty feeder to a healthy one is made possible with SSTS in a short period of time. The impact of capacitor size on harmonic generation in a D-STATCOM is also analyzed. The industry standard power system package, namely PSCAD/ EMTDC is used for model implementation and to carry out extensive simulation studies.