Application of New FACTS Device (CUPFC) In the Transient Stability Enhancement of AC Transmission Systems

The UPFC is the most elegant device of FACTS controllers. It consists of two voltage source converters with one common DC link capacitor that are connected in parallel and in series. Each converter can independently generate or absorb reactive power. The ordinary UPFC has 4 control variables (phase and magnitude of shunt and series converters). Using these control variables it is possible to control the line active power flow, sending or receiving end reactive power, AC bus voltage and DC link voltage. Because of the limited number of control variables, the ordinary UPFC is not capable of controlling the line active and reactive powers of two machine system, simultaneously. To overcome this problem, a new topology of UPFC has been used. This new FACTS device is named center node UPFC (C-UPFC) installed at the midpoint of transmission line. The proposed device consists of three IGCT based voltage source converters. A shunt converter is connected at the midpoint of two series connected converters. In this paper the capabilities of this device will be discussed. The theory, transient model of a new FACTS device, C-UPFC, is presented in this paper. Also, a control system for this device is presented. The presented model and control system of C-UPFC is validated with help of the PSCAD/EMTDC simulation program. In this paper C-UPFC is simulated under different operating conditions.

FACTS, CUPFC, UPFC, Power Oscillations Damping, Transient Stability

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