

All Figures:

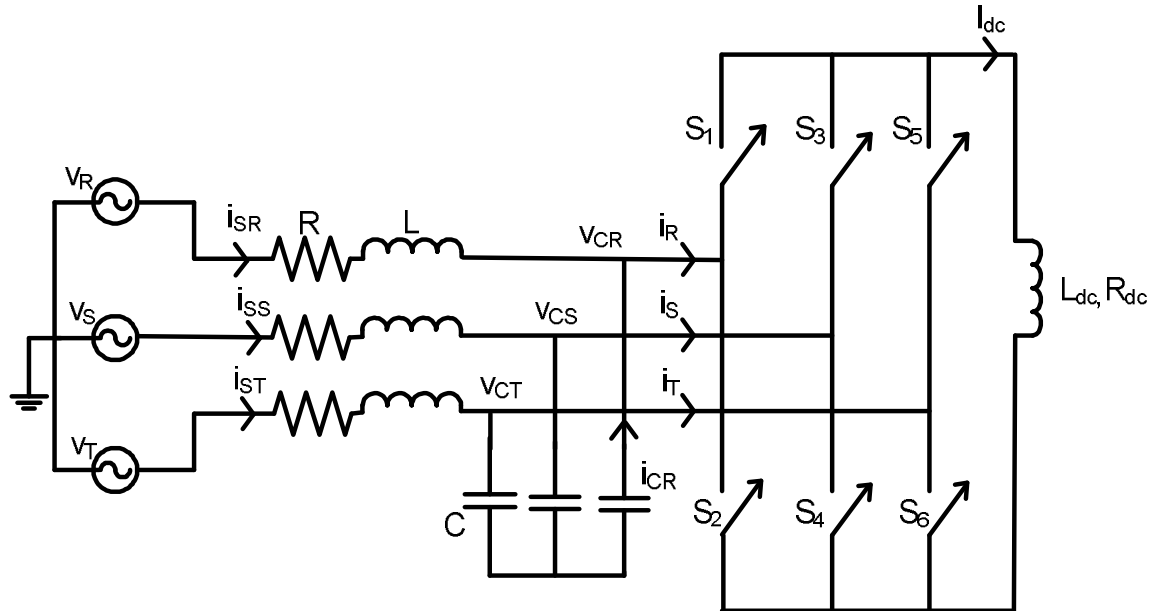


Fig. 1 The representation of CSC based STATCOM

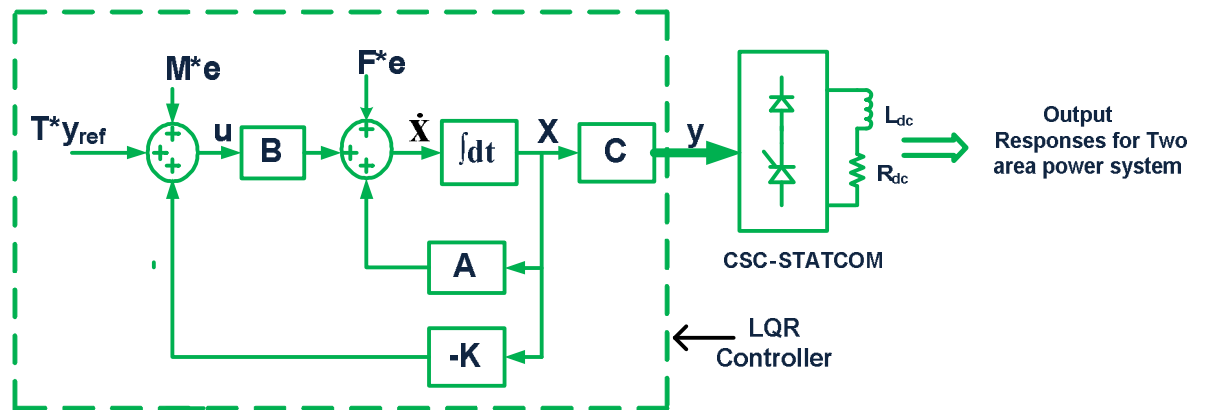
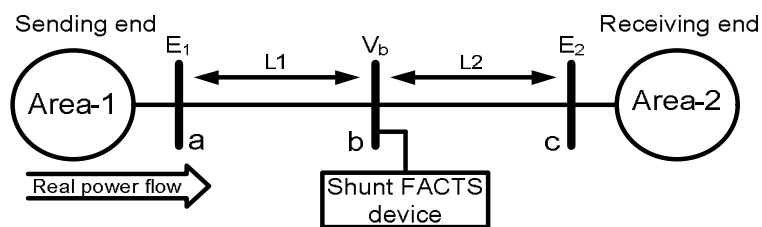


Fig. 2. Control Structure of LQR based CSC-STATCOM



(a)

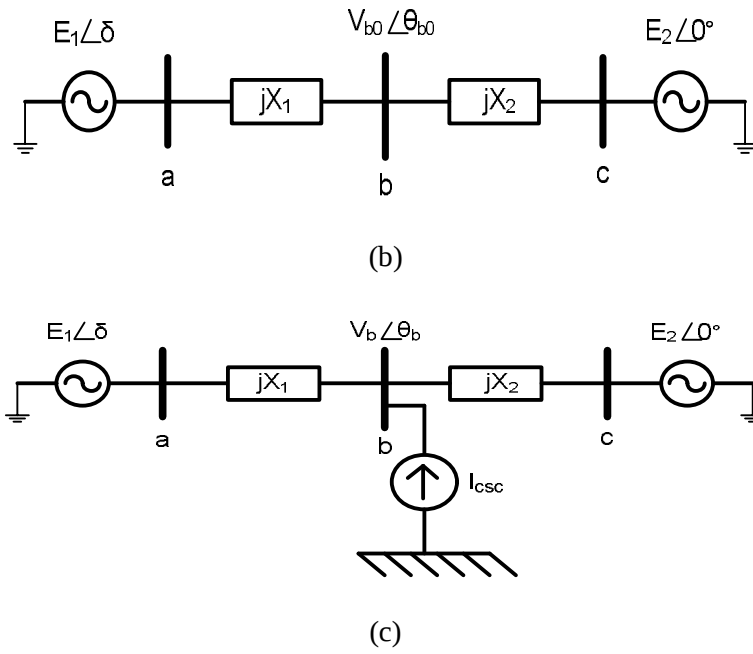


Fig. 3 A two-area two-machine power system with CSC-STATCOM; (a) A single line diagram; (b) Simplified model of the test system without CSC-STATCOM; (c) Simplified model of the test system with a CSC-STATCOM as a current injection device.

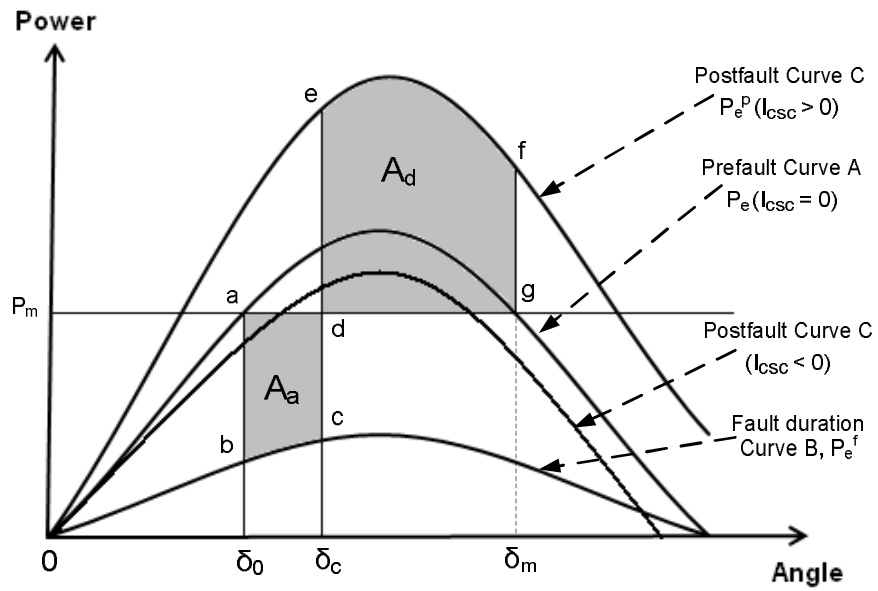


Fig. 4 Power-Angle characteristic of the test system with a CSC-STATCOM

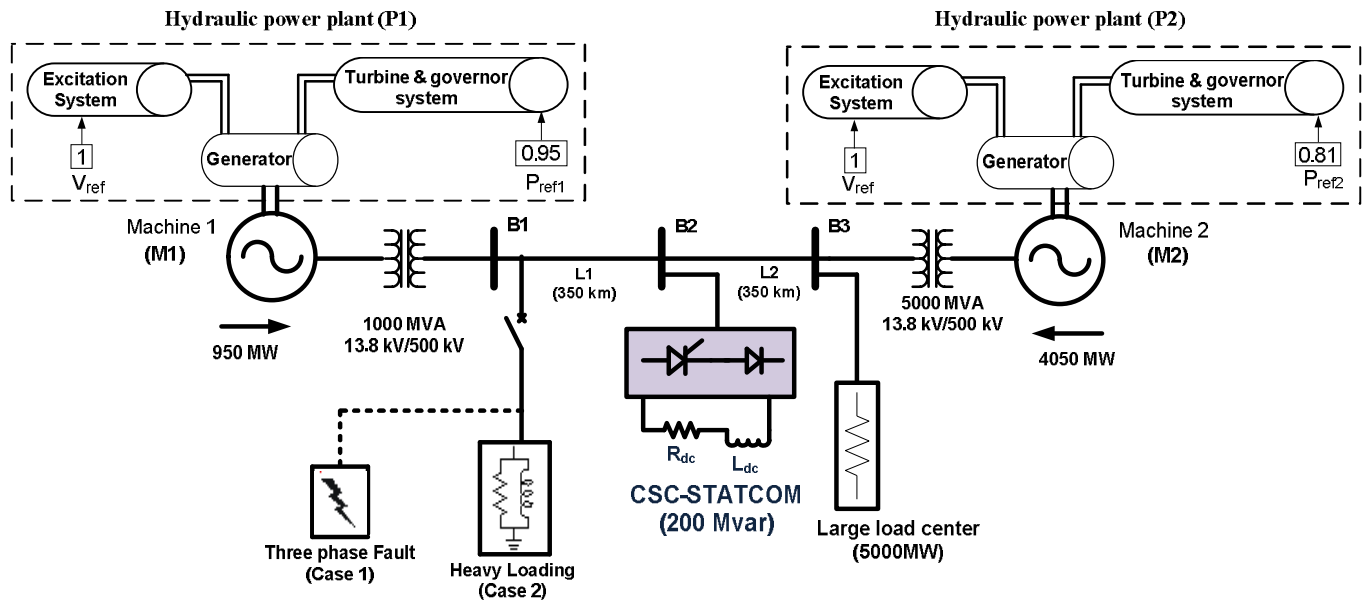


Fig. 5 The test model diagram with different shunt FATCS devices for transient stability study of two power plants (P1 & P2).

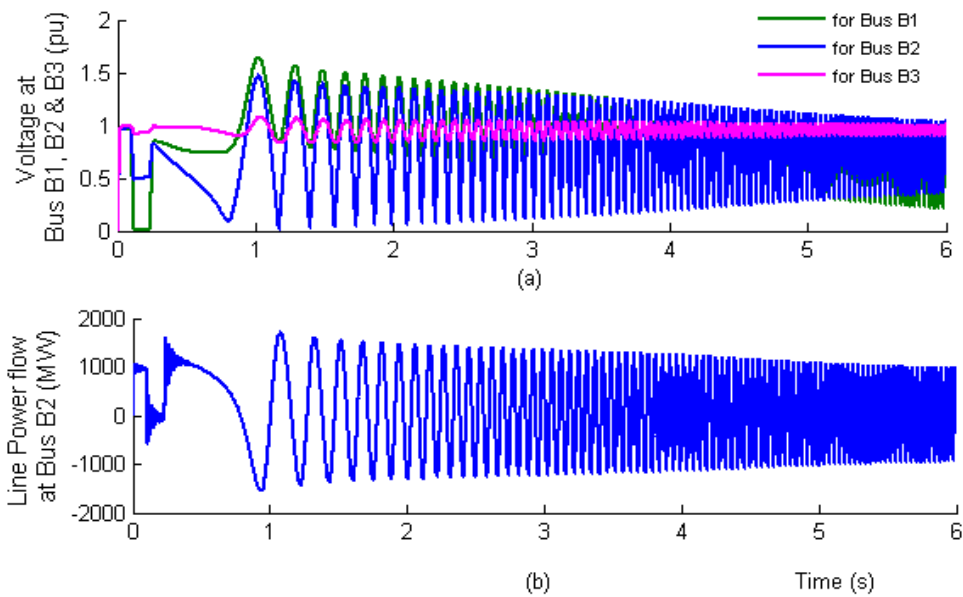


Fig. 6 Test system response without CSC-STATCOM for a three phase fault (Case-1). (a) Positive sequence voltages at different buses B1, B2 & B3 (b) Power flow at bus B2.

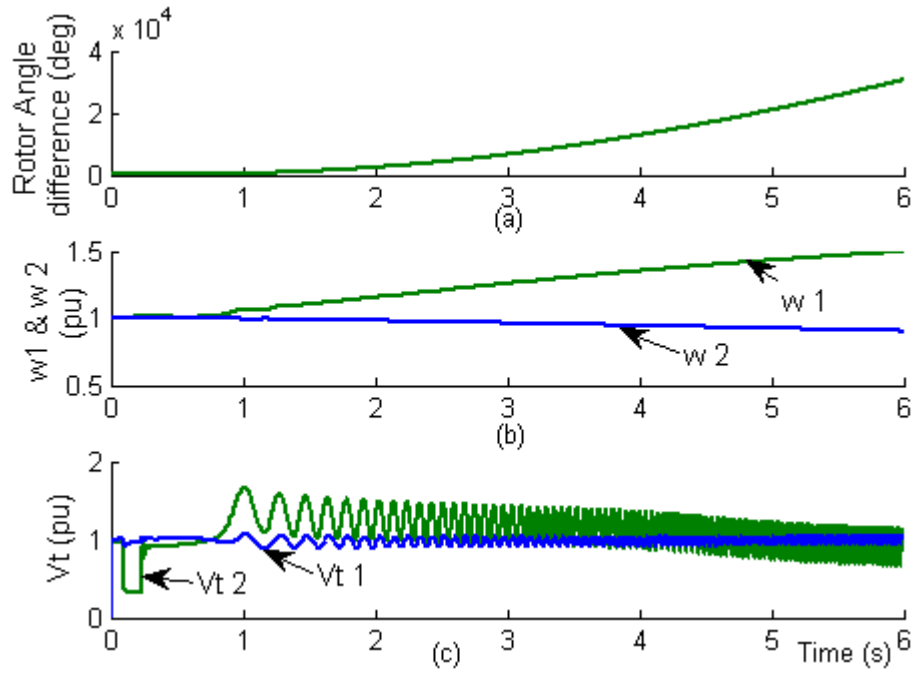


Fig. 7 System response without CSC-STATCOM for Case-1 (a) Difference between Rotor angles of machines M1 & M2 (b) $w1$ & $w2$ speeds of machine M1 & M2 respectively (c) terminal voltages $Vt1$ & $Vt2$ of generators M1 & M2 respectively.

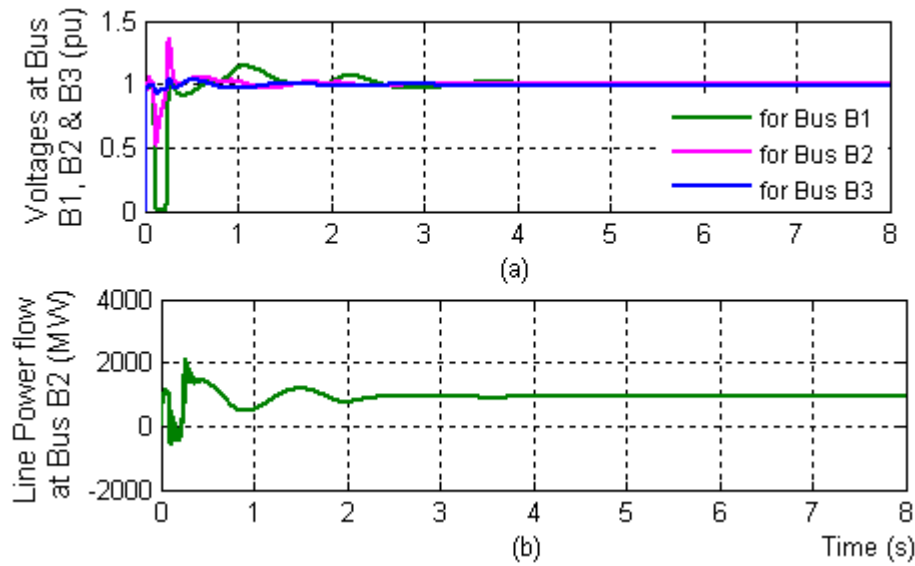


Fig. 8 Test-system response with CSC-STATCOM for a three phase fault (Case-1). (a) Positive sequence voltages at different buses B1, B2 & B3 (b) Power flow at bus B2

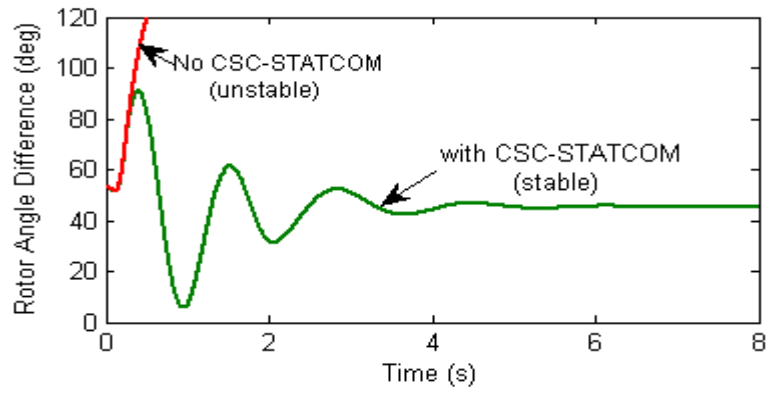


Fig. 9 Rotor angles difference of machines M1 & M2 for case-1

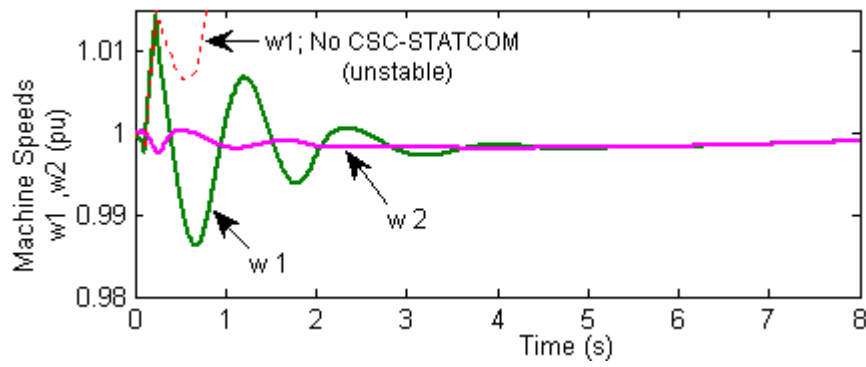


Fig. 10 Machine speeds w_1 & w_2 with CSC-STATCOM for case-1

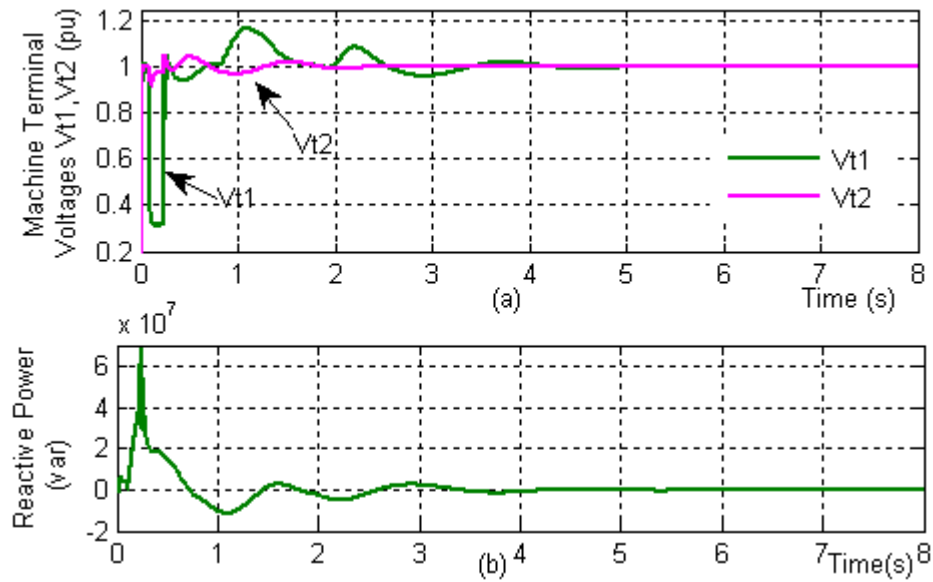


Fig. 11 For case-1 (a) terminal voltages V_{t1} & V_{t2} of generators M1 & M2 with CSC-STATCOM respectively (b) reactive power inject (or absorb) by CSC-STATCOM.

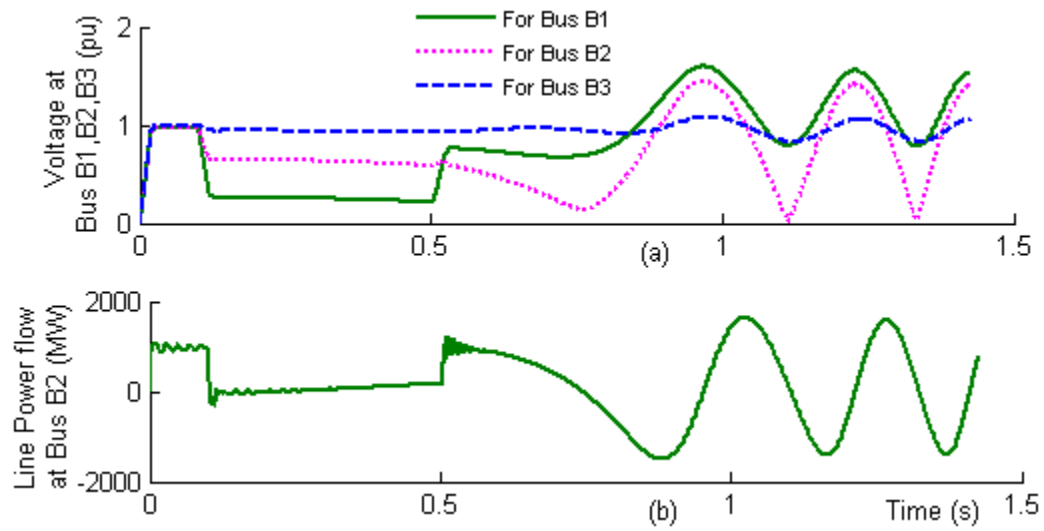


Fig. 12 The test system response without CSC-STATCOM for a heavy loading (Case-2). (a) Positive sequence voltages at different buses B1, B2 & B3 (b) Power flow at bus B2

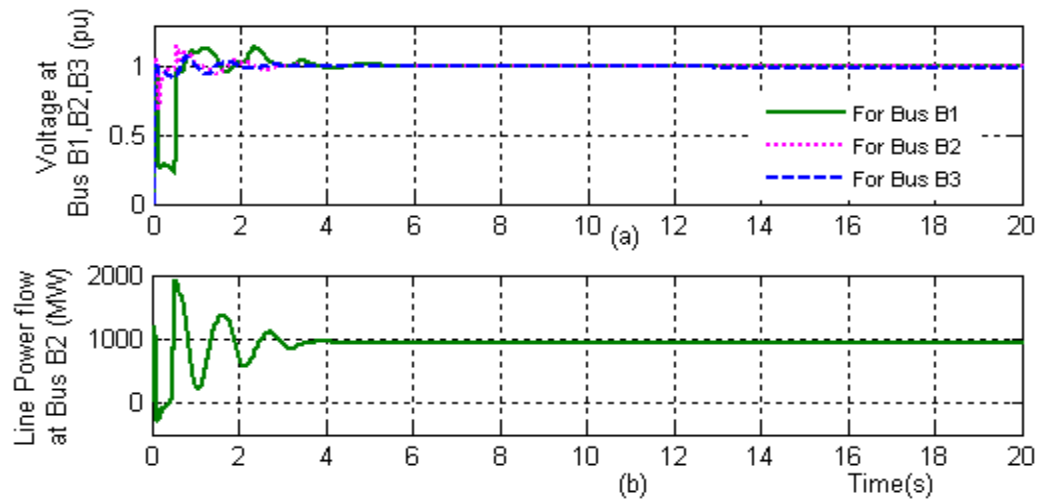


Fig. 13 The test system response with CSC-STATCOM for a heavy loading (Case-2). (a) Positive sequence voltages at different buses B1, B2 & B3 (b) Power flow at bus B2

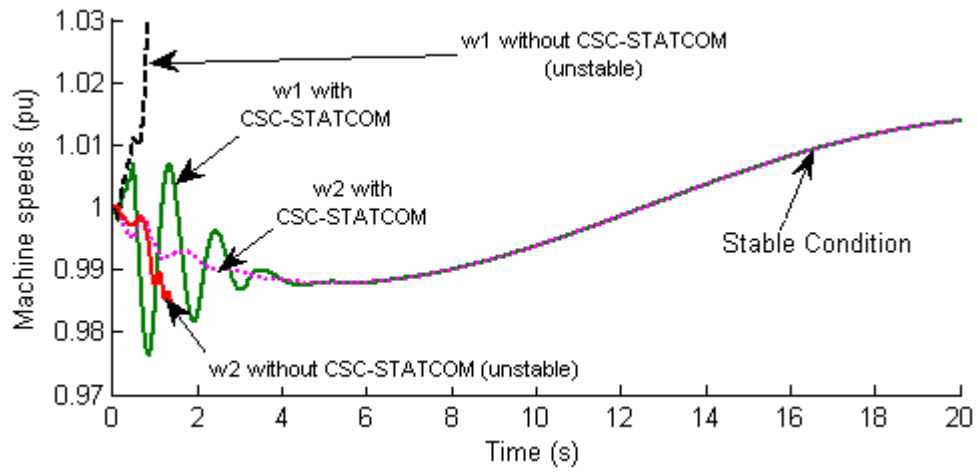


Fig. 14 Speeds w_1 & w_2 for machines M1 & M2 respectively for case-2.

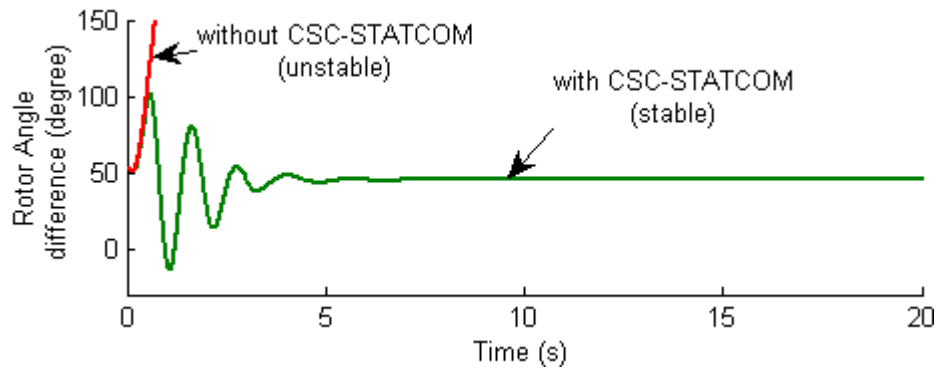


Fig. 15 Rotor angle difference of machines M1 & M2 for system with and without CSC-STATCOM in case-2.

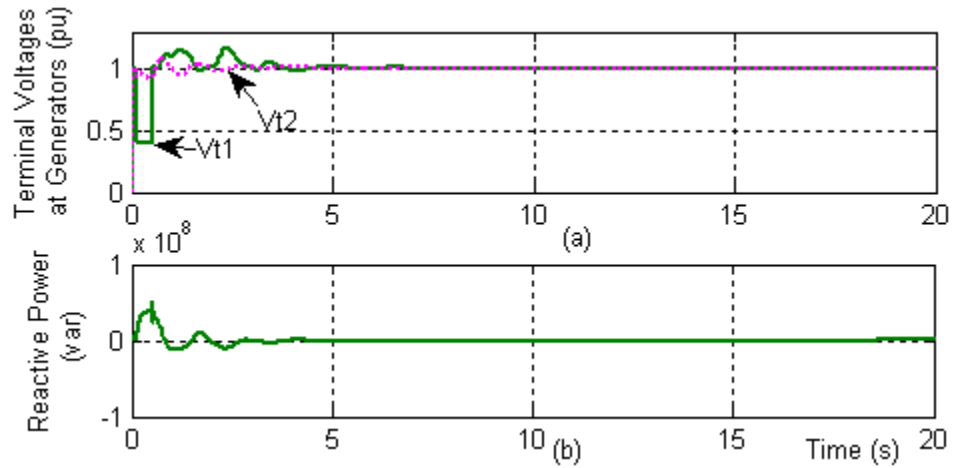


Fig. 16 For case-2 (a) terminal voltages V_{t1} & V_{t2} of generators M1 & M2 with CSC-STATCOM respectively (b) reactive power inject (or absorb) by CSC-STATCOM.

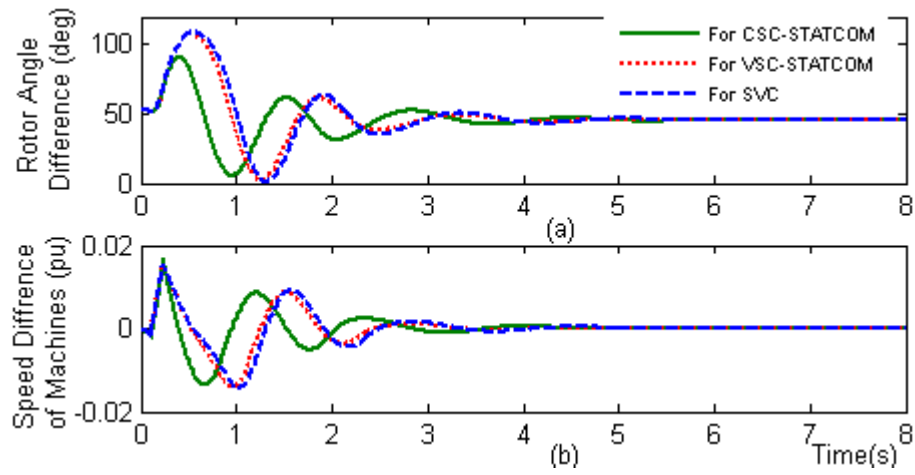


Fig. 17 System response with different shunt FACTS devices (CSC-STATCOM, VSC-STATCOM & SVC) for Case-3 (a) Difference between Rotor angles of machines M1 & M2 (b) speed difference of machines M1 & M2

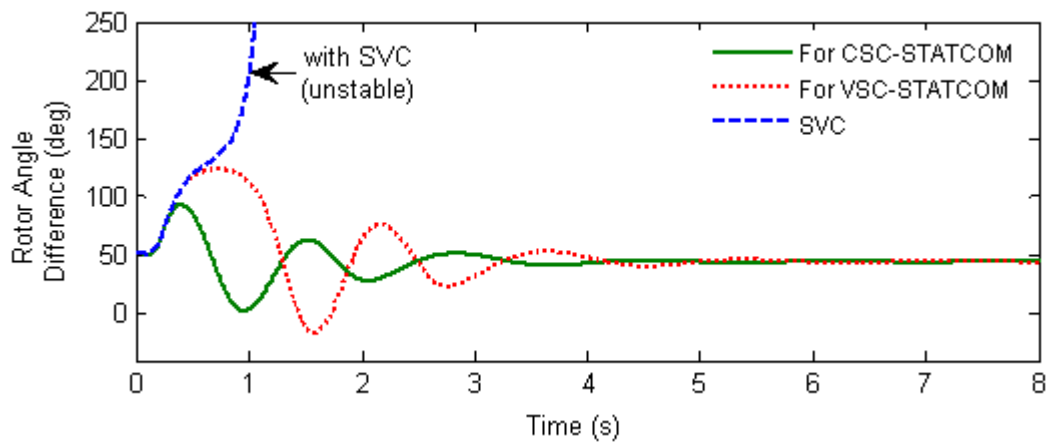


Fig. 18 Rotor angles Difference of machines M1 & M2 with different shunt FACTS devices (CSC-STATCOM, VSC-STATCOM & SVC) for Case-3 (3-phase fault for 0.1s to 0.2s).