Analysis And Assessment Of STATCOM-Based Damping Stabilizers For Power System Stability Enhancement

Abido, MA

ELSEVIER SCIENCE SA, ELECTRIC POWER SYSTEMS RESEARCH; pp: 177-185; Vol: 73

King Fahd University of Petroleum & Minerals

http://www.kfupm.edu.sa

Summary

Power system stability enhancement via STATCOM-based stabilizers is thoroughly investigated in this paper. This study presents a singular value decomposition (SVD)-based approach to assess and measure the controllability of the poorly damped electromechanical modes by STATCOM different control channels. The coordination among the proposed damping stabilizers and the STATCOM internal ac and dc voltage controllers has been taken into consideration. The design problem of STATCOM-based stabilizers is formulated as an optimization problem. For coordination purposes. a time domain-based multiobjective junction to improve the system stability as well as ac and dc voltage regulation is proposed. Then. a real-coded genetic algorithm (RCGA) is employed to search for optimal stabilizer parameters. This aims to enhance both rotor angle stability and voltage regulation of the power system. The proposed stabilizers are tested on a weakly connected power system with different disturbances and loading conditions. The nonlinear simulation results show the effectiveness and robustness of the proposed control schemes over a wide range of loading conditions. It is also observed that the proposed STATCOM-based damping stabilizers extend the critical clearing time (CCT) and enhance greatly the power system transient stability.

References:

1. *MOD POW EL EQ FAC, 1998, 380108 CIGRE TASK FO
2. ABDELMAGID YL, 1999, IEEE T POWER SYST, V14, P1428

3. ABIDO MA, 2002, P 14 POW SYST COMP C
4. CONG L, 2002, IEE P-GENER TRANSM D, V149, P659, DOI
5. 10.1049/ip-gtd:20020651
6. HAMDAN AMA, 1999, INT J ELEC POWER, V21, P417
7. HAMMAD AE, 1986, IEEE T POWER SYST, V1, P222
8. HERRERA F, 1998, ARTIF INTELL REV, V12, P265
9. HINGORANI NG, 2000, UNDERSTANDING FACTS
10. HSU YY, 1987, IEE PROC-C, V134, P238
11. KOBAYASHI K, 2003, IEEE BOL POW TECH C
12. KUNDAR P, 1994, POWER SYSTEM STABILI
13. KUNDUR P, 1989, IEEE T POWER SYST, V4, P614
14. LEE YS, 2002, INT J ELEC POWER, V24, P771
15. MITHULANANTHAN N, 1993, IEEE T PWRS, V18, P786
16. MORRIS S, 2003, ELECTR POW SYST RES, V65, P23
17. NOROOZIAN M, 1994, IEEE T POWER DELIVER, V9, P2046
18. PADIYAR KR, 2003, INT J ELEC POWER, V25, P155
19. SAHOO NC, 2002, ELECTR POW SYST RES, V62, P81
20. WANG HF, 1999, IEE P-GENER TRANSM D, V146, P521
21. WANG HF, 2003, INT J ELEC POWER, V25, P387

For pre-prints please write to: mabido@kfupm.edu.sa