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Development of Power System Stability by Reactive Power Planning in Wind Power Plant With Doubley Fed Induction Generators Generator

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Abstract : The use of distributed and renewable sources in power systems has grown significantly, recently. One the most popular sources are wind farms which have grown massively. However, ¬wind farms are connected to the grid, this can cause problems such as reduced voltage stability, frequency fluctuations and reduced dynamic stability. Variable speed generators (asynchronous) are used due to the uncontrollability of wind speed specially Doubley Fed Induction Generators (DFIG). The most important disadvantage of DFIGs is its sensitivity to voltage drop. In the case of faults, a large volume of reactive power is induced therefore, use of FACTS devices such as SVC and STATCOM are suitable for improving system output performance. They increase the capacity of lines and also passes network fault conditions. In this paper, in addition to modeling the reactive power control system in a DFIG with converter, FACTS devices have been used in a DFIG wind turbine to improve the stability of the power system containing two synchronous sources. In the following paper, recent optimal control systems have been designed to minimize fluctuations caused by system disturbances, for FACTS devices employed. For this purpose, a suitable method for the selection of nine parameters for MPSH-phase-post-phase compensators of reactive power compensators is proposed. The design algorithm is formulated ¬¬as an optimization problem searching for optimal parameters in the controller. Simulation results show that the proposed controller Improves the stability of the network and the fluctuations are at desired speed.

Keywords : renewable energy sources, optimization wind power plant, stability, reactive power compensator, double-feed induction generator, optimal control, genetic algorithm
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