Optimal Tuning of SVC and STATCOM Control Parameters in order to Improve the Dynamic Performance of Power System Connected to Doubly Fed Induction Generator

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Abstract:

In recent years, due to shortage of energy resources, use of new energies such as wind energy has been rising. Therefore, the study for the optimal use of these energy resources is very necessary. Nowadays, doubly fed induction generators (DFIGs) are used in modern wind power plants. Stability investigation of power system connected to DFIG is very essential. Static VAR compensator (SVC) and static synchronous compensator (STATCOM) are installed in parallel with transmission lines. The main applications of these compensators are fixing and adjusting of the voltage in a certain amount and stability improvement. Parameters tuning of these compensators is very important. In this research, at first, an appropriate way is suggested in order to choose the objective function for minimizing oscillations resulted from disturbances. Then optimal tuning of SVC and STATCOM control parameters will be done by genetic algorithm in the form of an optimization. Ultimately, efficiency of suggested methods will be considered in order to improve the stability of DFIG voltage, DFIG rotor speed, DFIG active power and the rotor speed of synchronous generators. This topic is evaluated and analyzed in a sample network with considering and comparison of results in the presence and absence of SVC and STATCOM. All simulation and optimization steps are done by the MATLAB software.

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Keywords: DFIG, Genetic algorithm, Optimal tuning, STATCOM, SVC