

Developing Algorithm and Program for Power Flow Analysis in Power System with STATCOM*

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Abstract

Keeping the voltage within the required limits is one of the key issues of operating a power system. since the voltage in electrical power system is affected significantly by changes of loads and equivalent circuit of the power system, there is a need to regulate the voltage with high control ability. Because of the growing use of FACTS in General and STATCOM among them in power systems to improve voltage stability, and because of the need for software that is not always available, the aim of research is to develop a mathematical model, algorithm and software for load flow analysis at the steady state of power system includes static synchronous compensator STATCOM.

The Jacobian matrix in the Newton –Raphson algorithm, which is the relationship between voltage and power mismatches, is extended with the STATCOM variables to adjust the voltage and control of the reactive power witch is injected or absorbed at the point of common coupling, with high controlability.

A Complete software has been developed that includes comprehensive control facilities and exhibits very strong convergence characteristics. A Sophisticated algorithm has been verified and the effectiveness of the program is tested by its application to a number of standard power systems including the IEEE 5-bus system, and Syrian transmission network 400 kV.

Keywords: STATCOM, FACTS, Newton-Raphson, load flow algorithm, load flow analysis.

* For the paper in Arabic see pages (35-51)

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