

Determination of proximity to static voltage collapse using CPF-GMRES method

ABSTRACT

Voltage collapse is an event that causes major concern to the power system utility nowadays. The effect can be catastrophic to the power system where it can cause total collapse to the operation of the system. The study of the voltage collapse phenomenon can provide a way to prevent this event from happening. There have been many methods developed to study the criteria of voltage collapse phenomenon but static analysis probably provide the best way to study this phenomenon. Conventional Newton Raphson method has the singularity problem on its Jacobian matrix and thus could not give the solution. To overcome this problem, one of the solutions is the continuation power flow (CPF) method. CPF method is a very powerful method that can give the solution without having the singularity problem. The key to the CPF method is through the predictor and corrector technique used. This paper focuses on improvement of the time taken by the CPF method by enforcing the general minimal residual (GMRES) method at the initial point at the start up. The robustness of the standard CPF method is also improved using the new CPF-GMRES method. The convergence properties of this new method will be analysed and compared with the standard CPF method.

Keyword: Bifurcation analysis; CPF-GMRES method; CPFmethod; GMRES method; Static voltage collapse