An Efficient and More Reliable Second Order Power Flow Solution Method with Interpolation Technique

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Abstract

This research presents a fast, reliable, and new method for solving the load (power) flow problem of electrical power systems. The proposed method is a second order load flow technique based on the "Taylor series expansion" of a multivariable function. This approach takes the first three terms of the Taylor series. The method has advantages over Newton's method in terms of computation time for solution (no. of iterations), and reliability of convergence. By inserting a minimization technique in this proposed method, the algorithm exhibits a control of the convergence. By means of this control, the method converges for cases when conventional Newton's method and some other popular methods diverge. Also this paper presents a comparison between the proposed method and Newton-Raphson method according to the major criteria, namely reliability of convergence and speed of solution. Two test systems (five busbars typical test system and forty busbars practical system based on Iraqi National Grid) are used to examine the performance of each method.

References

Index Terms

Computer Science

Power Systems

Keywords

Cubic interpolation techniques, Load flow problem, Second order load flow model, Taylor series expansion, Voltage magnitude and phase angle