Interval Newton/Generalized Bisection in the resolution of Electrical Power Load Flow Problem

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Abstract

This paper presents an interval approach to a classic electrical engineering paradigm: the Power Load Flow problem. The solution to this problem is fundamental to any behavior and sensibility analysis of electrical power transmission systems, as a consequence of network parameters alteration due to different causes. This classical nonlinear system of equations with several practical restrictions is presently solved with some Newton Method variant. The present work proposes an Interval Newton/Generalized Bisection method, which conveys the advantages of high accuracy and automatic verification as well as the assurance to find all the solutions inside a studied region.

The paper presents a parallel implementation using an Interval Newton/Generalized Bisection method on a network of personal computers. It compares experimental results using a sequential and different parallel asynchronous implementations to solve standard electrical systems with up to 88 buses, reporting good Speed-Up values. The analysis of the experimental results naturally leads to pose the use of interval methods in several problems of the electrical engineering area.

Keywords: Interval Newton/Generalized Bisection method, Intervals Methods in Electrical Engineering, Electrical Power Load Flow , Parallel and Distributed Processing.

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