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# A powerful method for solving the power flow problem in the ill-conditioned systems

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## Highlights

- Application of NLS-CLM method to solve the ill-conditioned power systems is presented.

- Effectiveness of the proposed method in comparison with the famous benchmark methods.

- Significant reduction of the CPU time in comparison with the benchmark methods.

- Significant reduction of the number of iterations in comparison with the other methods.

## Abstract

In most cases, the power systems are well-conditioned and the power flow problem (PFP) can be solved by using the famous Newton or Newton-based methods. However, in some cases, the

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conditions of the power systems are ill and the above-mentioned methods are poorly converged or even diverged. This paper presents application of corrected Levenberg-Marquardt algorithm with a non-monotone line search for solving the PFP in the ill-conditioned power systems. The presented algorithm is evaluated on the case studies ranging from small to large (30-bus, 57-bus, 118-bus and 2383-bus). Simulation results show the proposed approach converges in all of the case studies. Moreover, application of the proposed method for solving the PFP in ill-conditioned power systems can significantly reduce the CPU time and number of iterations in comparison with the benchmark methods.

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