



Ain Shams University
Faculty of Engineering
Department of Engineering Physics and Mathematics

APPLICATION OF OPTIMIZATION TECHNIQUES ON ECONOMIC DISPATCH

A Thesis Submitted
For The Degree of Masters of Science in Engineering
Mathematics

Prepared by:
Eng. Fatma Sayed Mahmoud Sayed Moustafa

Under the supervision of
Prof. Dr. Niveen Mohamed Khalil Badra
Department of Engineering Physics and Mathematics
Faculty of Engineering, Ain Shams University

Prof. Dr. Almoataz Youssef Abdelaziz
Department of Electrical Power and Machines
Faculty of Engineering, Ain Shams University

Dr. Ahmed Mohamed Ibrahim El-Rafei
Department of Engineering Physics and Mathematics
Faculty of Engineering, Ain Shams University

2017



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Prepared by:

Eng. Fatma Sayed Mahmoud Sayed Moustafa

Bachelor in Electrical Power Engineering
Department of Electrical Power and Machines
Ain shams University

Examination Committee

Title, Name and Affiliation

Signature

Prof. Dr. Mahdi Mohamed El-arini

Department of Electrical Power and Machines
Faculty of Engineering, Zagazig University

Prof. Dr. Reda Amin Elbarkouky

Department of Engineering Physics and Mathematics
Faculty of Engineering, Ain Shams University

Prof. Dr. Niveen Mohamed Khalil Badra

Department of Engineering Physics and Mathematics
Faculty of Engineering, Ain Shams University

Prof. Dr. Almoataz Youssef Abdelaziz

Department of Electrical Power and Machines
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ABSTRACT

The design and performance of electric power systems has attracted the attention of many researchers. With the increase in the price of operation and the limitation of generation resources, effort is put in improving efficiency of generation and operation of power plants. Economic load dispatch is crucial since it is required to schedule committed generating units so as to meet load demand at minimum operating cost satisfying all unit and system equality and inequality constraints and limitations imposed on the generating units during operation.

To solve the economic load dispatch problem, traditional and intelligent techniques were applied. The traditional techniques are simple and fast, however, they have the disadvantage of converging to local optimum solutions rather than global optimum solutions. Researchers have shown interest in utilizing metaheuristic methods to solve complex optimization problems in real life applications. Metaheuristic methods solve the most complex optimization problems rapidly and global optimum solutions are most probably guaranteed.

Firefly algorithm is suitable for solving the economic load dispatch problem. Compared to other techniques, firefly algorithm has a high convergence speed and can deal with multimodal and non-linear optimization problems efficiently. Yet, it could get trapped in local optima, its parameters aren't dynamic and it doesn't memorize previously superior solutions.

In this study, three recent modifications of the firefly algorithm: modified firefly algorithm, memetic firefly algorithm, and variable step size firefly algorithm were applied to solve the economic load dispatch problem. Their performance were evaluated and compared with each other and to the original firefly algorithm. Numerical simulations were implemented and show the efficiency of the modified firefly algorithm over the other approaches.

ACKNOWLEDGEMENT

First of all, I am grateful for Allah for all the blessings and bounties He has bestowed on me.

I would like to express my sincere thanks and gratitude to my supervisors Prof. Niveen Badra, Prof. Almoataz Abdelaziz and Dr. Ahmed El-rafei for their guidance and continuous support throughout the dissertation work. Without their motivation and counsel, this thesis wouldn't have been possible.

I am thankful for the help and advice given by Dr. Mahmoud Othman, Dr. Osama Shahin, Eng. Rana Elnahal, Eng. Dina Said and Eng. Nayera Sameh in regards of algorithms, MATLAB and programming.

I am grateful for my family's encouragement and love: my mother Nadia and my three brothers Ahmed, Hassan and Omar and my sister in law Armina.

I would like to thank my supportive friends who can't wait to attend my master's defense: Lobna Said, Samar Shukry, Nada Selim, Nada Yahya, Youssef Osama, Khalid Enany, Ahmed Mahmoud, Nora Magdy, Ahmed Emad, Khalid Anwer and Noha Mamdouh.

Finally, my father Sayed, you have always encouraged me to follow my dreams and succeed in my studies and life. I owe it all to you and I wish you were with me but I know that you are proud of me.

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