

ABSTRACT

This research focuses on solving economic dispatch problems for the Java-Madura-Bali power system using the lambda iteration method, which is known for its accuracy but time-consuming nature. The Java-Madura-Bali power system is an essential piece of infrastructure for Indonesia, and maximizing its performance is critical to ensure a reliable supply of electricity. Although artificial-based methods are faster, they have limitations in terms of accuracy and understanding of the solution mechanism. This thesis proposes a lambda iteration utilizing vectorization technique, which enhances the solution precision and computation time, making it an effective method for resolving complex economic dispatch problems in power systems.

The vectorized lambda iteration method is an advanced technique for solving complex economic dispatch problems in power systems. It improves upon the conventional lambda iteration method by using matrix and vector operations to speed up the computation time and increase the solution precision. To ensure practical solutions, the vectorized approach must consider the operational constraints of the convex optimization. This method provides faster solutions while maintaining accuracy and improving understanding of the solution mechanism. It also can guarantee 100% accuracy, the vectorized lambda iteration approach is a highly effective method for resolving economic dispatch problems in power systems, ultimately improving system efficiency and reliability.

As a result, VLIM stands out among the algorithms tested for its high accuracy in power allocation, achieving 100% accuracy in meeting the dynamic power demand with a fast computing time of only 3 seconds. Both LIM and GA also meet all three constraints applied in the test, but VLIM's combination of high accuracy and fast computing time makes it a particularly effective algorithm for ensuring power system stability and reliability. Although it is not the cheapest option, VLIM remains a reliable choice compared to LIM-WOA, which fails to meet the generation limit constraint.

Keywords: *Economic Dispatch, Lambda Iteration Method, Vectorization Techniques, Java-Madura-Bali Power System*