

## COVER LETTER

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Dear,

I wish to submit an original research article entitled "**OPTIMAL DESIGN ENERGY STORAGE FOR LOAD FREQUENCY CONTROL IN MICRO HYDRO POWER PLANT USING FLOWER POLLINATION ALGORITHM**" for consideration by SINERGI.

I confirm that this work is original and has not been published elsewhere, nor is it currently under consideration for publication elsewhere.

In this paper, I/we report on / show that:

|                    |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Topic              | : | Load Frequency Control                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Brief Background   | : | The frequency and voltage of electricity generated by micro hydro is greatly influenced by the rotational speed of the generator, where the rotational speed of this generator is greatly influenced by changes in load. Therefore, a technology is needed to optimize micro hydro performance, one of which is by applying Load Frequency Control (LFC). This LFC mechanism is designed using Superconducting Magnetic Energy Storage (SMES) and Capacitive Energy Storage (CES), which have the ability to provide power compensation in order to reduce or even eliminate frequency oscillations caused by changes in the electrical power load of customers. |
| Research Problem   | : | To get optimal SMES and CES performance, optimal parameter tuning is needed. This research uses artificial intelligence method based on Flower Pollination Algorithm (FPA) for optimization of SMES and CES parameters.                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Overview of Method | : | This FPA algorithm mimics the pollination behavior of insects in the universe. Insects will move from flower to flower to help pollinate flowers. This principle we adopted and developed in this study to be used in optimizing the SMES and CES parameters based on the                                                                                                                                                                                                                                                                                                                                                                                        |

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|---------------------|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |   | objective function Integral Time Absolute Error (ITAE).                                                                                                                                                               |
| Significant finding | : | The application of the Flower Pollination Algorithm method as an optimization method for SMES and CES parameters can improve system performance. With optimal tuning it results in increased micro hydro performance. |

We have no conflicts of interest to disclose.

Thank you for your consideration of this manuscript.

Sincerely,  
Muhammad Ruswandi Djalal



## AUTHORSHIP STATEMENT

I/We wish to submit an original research article entitled “OPTIMAL DESIGN ENERGY STORAGE FOR LOAD FREQUENCY CONTROL IN MICRO HYDRO POWER PLANT USING FLOWER POLLINATION ALGORITHM” for consideration by SINERGI.

All persons who meet authorship criteria are listed as authors, and all authors certify that they have participated sufficiently in work to take public responsibility for the content, including participation in the concept, design, analysis, writing, or revision of the manuscript.

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