UNIVERSITI TEKNOLOGI MARA

FAILURE DETECTION ANALYSIS OF GRID-CONNECTED PHOTOVOLTAIC SYSTEMS IN TROPICAL CLIMATE REGION

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Thesis submitted in fulfillment
of the requirements for the degree of
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(Photovoltaics System)

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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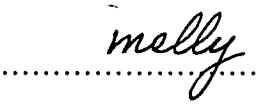
Signature of Student	:	
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ABSTRACT

Monitoring of photovoltaic (PV) system performance for optimum energy output in Malaysian climate is crucial due to the rapid development of PV system installation and application. For tropical climate condition, most of the related studies were on fault detection with very few were on failure detection (FD). Therefore, the aim of the study is to identify a fast, simple, and reliable method of FD on GCPV system in Malaysia. The objectives were: to develop the FD algorithm in GCPV system, to identify the types of fault occurrence in FD in GCPV system, and to verify the FD algorithm to be performed in Malaysian climate. The sources of data in this study were obtained from five sites in the testing and commissioning (T&C) of PV systems from Feed-in-Tariff (FiT) scheme under Sustainable Energy Development Authority (SEDA), and Green Energy Research Centre (GERC) Universiti Teknologi MARA (UiTM), Malaysia. Two additional sites from T&C of the FiT scheme were used for the verification of the new developed FD algorithm. These sites are in the Peninsular of Malaysia. Filtration and identification processes were performed to ensure the selection of reliable data. The FD algorithm has employed mathematical and statistical approaches to establish the relationship between the parameters. A modified threshold-based technique was used to build the FD algorithm based on data from PV system installed at GERC UiTM, Malaysia. The establishment of threshold value for DC array current ratio, R_c and DC string voltage ratio, R_v is optimal for the used in Malaysian climate conditions. The threshold value for R_c and R_v is 0.9721 and 0.9410, respectively. The results have shown the FD algorithm has successfully identified the types of failure occurrence in all the five PV systems. Finally, the verification on the two additional sites of FD algorithm has detected the 'No Fault' and 'Fault' as suggested by the type of failure occurrence and failure identification technique.

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May this modest work be a contribution to future studies and research.

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