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AN OPTIMAL UNDER FREQUENCY LOAD SHEDDING SCHEME FOR ISLANDED DISTRIBUTION NETWORK

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MSc

April 2018

ABSTRACT

Shutting down the Distributed Generation (DG) is no longer appropriate practice when losing main power supply. Alternatively, intentional islanding is implemented to allow DG to continuously supply power to the critical load. However, there are several technical issues need to be considered for islanding operation. The most challenging issue is to sustain the stability of frequency. Deviation of frequency for an island would occur resulting from active power imbalance following islanding. Load shedding is one of important measures in distribution system that can sustain the operation of the DG in islanded system during the occurrence of under-frequency. Technique most commonly applied is Under Frequency Load Shedding (UFLS). In this study, a new technique of UFLS for islanding operation is proposed. It considers the combination of optimal and fixed priority of load. Inclusive with the design of UFLS is a new module referred as Load Shedding Module (LSM). Two new algorithms i.e., Load Classification based Fuzzy Logic (LCFL) and Binary Evolutionary Programming (BEP) are introduced in the module. The LCFL is designed to classify the load based on its priority i.e., Vital, Semi Vital and Non-Vital. Classification is taken place considering Load Stability Index (LSI) and Load Regulation Factor (LRF). Semi vital and non-vital of load are then optimally selected to be shed by the BEP based on the amount of power imbalance resulting from islanding whilst the vital load is given fixed priority. Thus, the combination of priority provides flexibility for the technique in achieving an optimal load shedding. The performance of the proposed UFLS technique is evaluated on two scenarios i.e event and response based through simulation studies on the 1 lkV Malaysia distribution network. The validation of the proposed technique on different case studies for both scenarios proves that with the application of optimal load shedding, the technique comparatively displays an outstanding performance than an adaptive technique. The technique manages to restore the frequency to nominal without having any overshoot. However, the implementation of this technique is feasible for a smart grid distribution system possessing effective communication means, comprehensive monitoring tools and advanced sensors for transferring measurement data and executes load shedding.

ACKNOWLEDGEMENT

Firstly, Alhamdulillah, every word of praise and gratitude goes to Allah Almighty whose blessings and bounties are innumerable to realize and count, and due to respect to Holy Prophet (peace be upon Him) who enables us to recognize our creator and whose teachings are a role model for us to follow in the time of darkness and despair.

I would like to express my deepest and sincere gratitude to my main supervisor Dr Hasmaini Binti Mohamad for her patience, guidance, expertise and assistance throughout the period of my Master studies. I also would like to my second supervisor, Dr Nofri Yenita Binti Dahlan for her contribution and support.

Special dedication to my beloved parents Md Isa Bin Ramli and Zainah Binti Pit, for raising me and giving me full support during my study. The countless times they kept the children during our hectic schedules will not be forgotten. Special thanks also to my siblings for giving tremendous support and advices that make me stronger to overcome all the obstacles through completing this research and made this work possible. Most importantly, I would like to thanks the most important person in my life, my lovely husband, Muhamad Syazwan and my beloved son, Emir Mikael Bin Muhamad Syazwan for their full and continuously encouragement, devotion, patience and when the times got rough are much appreciated and duly noted. Thank you very much.

Very special thanks go to my advisor Dr Hazlie Bin Mokhlis who had given ideas to initiate this project and valuable feedback. Not also forgotten to all my friends in UM Power System lab: Mazaher, Javed, Kak Hazwani; and UiTM Power Energy and Artificial Intelligent Lab (PEARL): Azri, Azam, Zahirah, Aimi, Najwa, AH, Lily for continuously giving me support till the completion of this thesis whether exchanging ideas or helping out my simulation. May Allah give rewards for the kindness and true friendship.

TABLE OF CONTENTS