

VOLTAGE STABILITY ENHANCEMENT IN MICROGRID

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CERTIFICATE

We accept the work contained in this report as a confirmation to the required standard for the partial fulfilment of the degree of MS (EE).

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DEDICATION

In beginning, I would like to Thanks Almighty Allah whose graces are always with me and always remained a key source of my guidance, achievements and success in my career.

I heartily accept that my parents has provided big support for the completion of my educational career because they are the one whose hands are always up to pray for my success.

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I also appreciate my relatives and all other friends whose show support and love, and all other close ones, present and past, whose unconditional love make my journey possible.

DECLARATION OF AUTHORSHIP

I **Yasir Ahmad # 01-244151-025** hereby declare that content of this thesis is my own work and that it is the result of work done during the period of registration. To the best of my knowledge, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma of the university or other institute of higher learning, except where due acknowledgement has been made in the text.

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ABSTRACT

Energy crises have become a core issue for power utilities and costumers. Also it is main task to deliver continual power to inaccessible locations. DG's and microgrids are the very reasonable solution for these problems. Instability of voltage comes due to unsustain behaviour of RE sources like wind, photovoltaic and nonlinear loads. Variations in voltage are undesirable for consumers and utilities. The voltage stability is essential demand from consumers to avoid major damages.

To improve voltage stability many conventional techniques are used like capacitor banks, tap changers and transformers. But these conventional voltage stability techniques are inefficient with microgrid because of slow speed, big size and also it become cause of long term voltage instability with passing time.

In thesis, I used high frequency based switches FACTS devices in low voltage microgrid to improve voltage stability. I have used these types of FACTS devices like (TCSC, SSSC and UPFC) to improve voltage stability in low voltage microgrid. Also their comparison on the basis of time response. For implementation and verification MATLAB/SIMULINK has been used.

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ABBREVIATIONS

AC	Alternating Current
DC	Direct Current
DERs	Distribution Energy Resources
DGs	Distributed Generators
FACTS	Flexible Alternating Current Transmission System
GTO	Gate Turn-Off Thyristor
HV	High Voltage
PI	Proportional Integral
PID	Proportional Integral Derivative
PWM	Pulse Width Modulation
RE	Renewable Energy
SPWM	Synchronized Pulse Width Modulation
SSSC	Static Synchronous Series Compensator
STATCOM	Static Synchronous Compensator
SVC	Static Var Compensator
SVG	Synchronous Voltage Generator
TCR	Thyristor Controlled Reactor
TSC	Thyristor Switched Capacitor
TCSC	Thyristor Controlled Series Capacitor
UPFC	Unified Power Flow Controller
VSC	Voltage Source Converter
VSI	Voltage Source Inverter