DUT DURBAN UNIVERSITY OF TECHNOLOGY

ELECTRICAL POWER ENGINEERING

Department of Electrical Power Engineering

Postgraduate Research Template

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	Student Name / Surname	Mr Sibusiso Goodenough Ntombela	**Start Date**	26-07-2019	**Supervisor**	**Professor IE Davidson**
	Title of Project	High Performance Evaluation of a Smart Inverter in Power Distribution networks with High Solar-PV penetration.	**Completion**	18-04-2020	**Co-Supervisor(s)**	**None**
	Program of Study (M Eng. / D Eng.)		**M Eng. Electrical Power Engineering**			
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Synopsis of Research Project: (< 300 words)-

The Quality of Supply (QOS), Demand Side Management (DSM), and Power Outages in the national electric power grid remains a significant challenge in South Africa. The introduction of different renewable energy system technologies has become a feasible alternative to meet the load demands. The growing number and capacity of PV installations connected to distribution networks, power quality issues related to voltage regulation are becoming relevant problems for power distribution utilities. This research investigation focuses on the use of smart inverters in critical PV installation, where relevant voltage fluctuations exist, to mitigate Q.O.S and DSM issues. The peculiar features of smart inverter are discussed in this study with real network parameters, monitoring data and measurements.

The main objective of the study is to demonstrate how the smart features of new inverters can be utilized to increase integration of PV systems in low voltage distribution networks. I will also utilize appropriate simulation tools to investigate the technical features of a three phase tied-grid inverter capabilities to regulate voltage profile by dynamically exchanging reactive power at the feeder Point of common coupling (PCC) through FACTS and SVC, using different methodologies, namely: Laboratory tests and compare with results obtained from the modelling and simulation of a smart inverter using PowerSim (PSIM), MATLAB/SIMULINK and Dig Silent Power factory software tools.

Keywords: Smart inverter, photovoltaic systems (PV), distribution networks, voltage regulation

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