ELECTRICAL POWER ENGINEERING

Department of Electrical Power Engineering

Postgraduate Research Template

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	Student Name / Surname	Elutunji Buraimoh	**Start Date**	Feb, 2018	**Supervisor**	**Prof I. E. Davidson**
	Title of Project	Development of Converter Based Microgrid with FCL Fault Ride-Through	**Completion**	2020	**Co-Supervisor(s)**	
	Program of Study (M Eng. / D Eng.)		**Doctor of Engineering**			
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Synopsis of Research Project: (< 300 words)

Microgrids especially the islanded microgrids with high penetration of renewable energy sources based distributed generation (DG) are vulnerable to faults and dynamic instability. Similarly, the power electronic converters that interface the DGs with the microgrid lack the dynamic features (inertia and damping properties) of typical synchronous generator and therefor lack the fault ride through capability due to their low overvoltage and overcurrent tolerance capabilities. Fault Ride through is the ability of electrical generating units to remain grid connected in the brief period of fault and after clearance. Consequently, when the microgrid fault current increases beyond limit, there is extremely low voltage as observed in the preliminary investigation and disconnection of inverter based DGs. Also during the period of fault, the Synchronous Generator within the microgrid contribute to the fault current in order to sustain the fault period before clearance or activation of protection. Consequently this work seek to address this challenge by using the Fault Current Limiter (FCL) strategy to effectively mitigate the fault current by rapidly providing protection during the fault in order to prevent the disconnection of the power electronic based converters of the DGs. Similarly, the FCL of choice is poised to improve the transient stability of the microgrid by using the fast response characteristics of the proposed FCL as a transition signal for the DGs. The effect of the proposed FCL arrangement is currently being tested and analyzed on a microgrid that consist off inverter based solar PV, battery energy storage, wind turbine and diesel generator with static and dynamic loads. To evaluate the performance of this development, a time-domain MATLAB/SIMULINK/SimPower simulation is currently being carried out.