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DISTRIBUTED GENERATION (DG) SITING AND SIZING FOR RELIABILITY ENHANCEMENT

A Thesis
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Abstract

Reliability assessment is of primary importance in designing and planning distribution systems that operate in an economic manner with minimal interruption of customer loads. With the advances in Distributed Generation (DG) techniques, DG is forecasted to increase in distribution networks. Therefore the study of reliability evaluation of Distributed Generation networks is of great importance.

This thesis investigates the impacts of the size and the location of the installed distributed generation units on the reliability of the distribution system. A computer software program is developed to evaluate the different reliability indices of electrical system using Monte Carlo Simulation method. The estimation of the variation of the reliability indices on the capacity of DG units and the impact of changing the type of DG on the reliability of the system are studied using the developed program.

Typical distribution system is selected for the analysis and both the size and the location of the installed DG unit were varied and reliability indices were calculated. The results obtained are then discussed.

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Acronyms

AENS	Average Energy Not Supplied
ASAI	Average Service Availability Index
ASUI	Average Service Unavailability Index
AUL	Average Unsupplied Load
BIM	Bus ID Matrix
CAIDI	Customer Average Interruption Duration Index
CC	Combined Cycle
CHP	Combined Heat And Power
Cts	Counts
DG	Distributed Generation
DISCOS	Distribution Companies
EENS	Expected Energy Not Served
ENS	Energy Not Supplied
FC	Fuel Cells
FMEA	Failure Mode And Effect Analysis
FT	Failure Time
GENCOS	Generation Companies
GT	Gas Turbine
HLI	Hierarchical Level I
HLII	Hierarchical Level II
HLIII	Hierarchical Level III
HY	Hydro
ISO	Independent System Operator
λ	Failure Rate
L	Average Load
LOEE	Loss of Energy Expectation
LOLE	Loss of Load Expectation
MT	Micro Turbine