

ENHANCED OPTIMAL SIZING AND SITING OF DISTRIBUTED GENERATION FOR POWER QUALITY IMPROVEMENT: A CASE STUDY OF SULEJA DISTRIBUTION NETWORK, NIGER STATE, NIGERIA

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ABSTRACT

The Point of Common Coupling (PCC) where supplier's responsibilities and customer's demands meet is of great concern. The generated quantity of electric power delivered to load centers of distribution systems from generating stations show differences; these differences are classified as technical losses. This research work presents Enhanced Optimal Sizing and Siting of Distributed Generation (DG) for Power Quality Improvement of Suleja Distribution Network. Electrical Transient Analysis Program (ETAP) load flows studies are made to compute the technical losses and application of Genetic Algorithm Optimization techniques programmed in MATLAB 2015 Software in 43- bus distribution system were used. The total load of the system considered as based case was $(3490 + j2700)$ kVA. Active and Reactive power losses in the system before DG installations were 246.300 kW and 289.903 kVAR respectively. DGs installation in the case study, has a considerable effects on loss reduction in the network. It is observed that 8.10% and 7.20% for active and reactive power loss reduction respectively were achieved while bus voltage improved by 0.4%. These satisfied the objective functions that compute present percentage losses, identified buses with poor voltage profile and determination of optimal sizing and siting of DGs where losses can be mitigated and power quality improved.

KEYWORDS: *Power Quality, Suleja Distribution Network*

Article History

Received: 07 Oct 2020 | Revised: 12 Oct 2020 | Accepted: 23 Oct 2020
