

Index for the Evaluation of Distributed Generation Impacts on Distribution System Protection

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ABSTRACT

Considering the present electric sector regulation that allows independent energy producers to access transmission and distribution systems, in addition to the presence of customers with energy exportation capabilities, and moreover governments' incentives to specific energy resources, Distributed Generation (DG) appears with a propitious and attractive frame for its rapidly expanding development.

Consequently, since distribution networks were neither conceived to be active nor to have a wide presence of generation units, electric utilities must be prepared with suitable analysis tools for this new scenario in order to take the correct decisions that lead to the best management of the system, regarding both technical and economical aspects. Various studies have demonstrated that integration of DG in distribution networks may create technical and safety problems [1]. DG may contribute to increased fault currents, cause voltage oscillations, interfere in voltage control processes, diminish or increase losses, etc. In fact, all our knowledge about distribution systems should be re-analysed as the DG impacts are significant for both planning and operation of distribution networks. Nevertheless, problems related with protection devices and coordination schemes require a special attention since they may weaken the reliability of the system [2]-[3].

In this work, the impacts caused by the insertion of DG into a distribution network with a protection scheme not designed for this new scenario will be evaluated by means of short circuit analysis. Thus, protection devices curves will be characterised by equations and stored in a database. Various insertion points for DG will be analysed in order to be compared. An index will be utilised as an attempt to quantify the adjustment and/or changes of devices that should be performed aimed at making suitable the protection scheme. This index is presented as a tool for characterising the investments that may be carried out for each potential configuration of the DG. Furthermore, the multiobjective analysis proposed in [4], aimed at quantifying the distributed generation impact on total losses, voltage profile and short circuit currents, could be enhanced by including this index.

References

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