

## **Abstract**

Changing the network's short-circuit network coverage in the presence of scattered sources of resources can change the time of the relay's operation due to the change in the flow of the transmission error from the network feeders, and thus interfere with the time coordination of the protective equipment. In order to reduce the impact of dispersed sources of production on the coordination of the safeguarding system, protection of coordination can also be considered in the planning of distributed generation sources. In this paper, a top priority is proposed for the location and planning of distributed generation sources. The priority-based index, based on the amount of unprotected energy resulting from any inconsistency, determines the location of distributed generation sources in a way that has the least effect on the coordination of network equipment. For modeling the research problem, non-linear modeling with integer numbers has been used in the form of an optimization problem. The objective function of the optimization problem, which includes a priority-based index, is based on the reduction of unsecured energy due to the occurrence of protection inconsistencies. The limitations of the research problem solving, including the set of technical and economic constraints in the distribution network, are considered in solving the problem. A teacher-learning optimization algorithm has been used to plan dispersed production resources with the aim of reducing network equipment protection inconsistency. To demonstrate the proposed solution's performance, this approach has been implemented on the IEEE 37-bus imbalance distribution network, and the results demonstrate the high efficiency of the proposed solution in optimal utilization of the maximum penetration rate of distributed generation sources.

**Keywords:** Conservation coordination, Distributed generation sources, Fuse-recloser, Unbalanced distribution network, Priority-Oriented Index, Teacher Learning Optimization Algorithm Introduction



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**The Thesis of M.Sc. in Electrical Power Engineering**

**Distributed generation placement  
in distribution system considering protection  
coordination using a priority based index**

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February 2018