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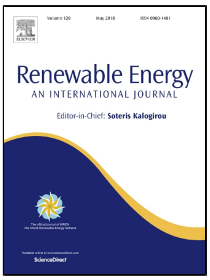

New Method for Optimal Allocation of Distribution Generation Aimed at Active Losses Reduction

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New Method for Optimal Allocation of Distribution Generation Aimed at Active Losses Reduction

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Abstract: A new methodology for studying the effect of wind power intermittency on electric power systems is proposed in this paper. The proposed stochastic method is based on the optimal power flow and sensitivity analysis techniques. These techniques are applied on a computational tool capable of allocating the intermittent energy with an exhaustive search technique with low computation time. The methodology was applied to reduce losses in the distribution systems of 34 and 70 buses. The results are compared with fixed power allocation considering the mean power of three different conditions: the average wind speed; generator capacity factor and maximum generator capacity. They showed that a stochastic method that considers each value of wind speed is necessary to determine the correct bus to allocate intermittent wind power.

Keywords: Wind Energy, Sensitivity Analysis, Distribution System and Distributed Generation Allocation.

1. Introduction

Electric power generation in the Brazilian energy matrix is predominantly of hydric origin. Nowadays, it is responsible for 75% of total generation [1]. When extended periods of drought occur, the offer of dispatchable energy decreases, showing the importance of introducing new power sources.

The amount of power losses in the Brazilian system over a year is equivalent to the country's greatest hydroelectric power plant production, Itaipu. This is due to the high distances between the loads and the generators in Brazil.

The wind power is a strong contender to be deeper explored. Today, in Brazil, only 6 GW/h of energy are generated through wind corresponding to 4.5% of the energy matrix [1]. In addition to having a great generation potential, it is also complementary to the rainfall. During drought periods, there is a tendency of more wind and in rainy periods less wind. However, the wind speed intermittency is a negative factor to be considered in all power energy planning, including the distributed generator (DG) allocation.