

عنوان مقاله:

Study of voltage harmonic contamination in the (MV) cables with metallic screen of multipoint earth and sheath voltage limiter in the micro grid networks

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خلاصه مقاله:

In recent years, with the growth of using renewable energy sources and their connection to the network, some unexpected problems in electrical equipment are observed. By integrating renewable energy sources with the ability to produce megawatts and two-way electrifying the cables, we observe the complexity of utilization issues, damage and cable failure arising from harmonic contamination. Renewable energy sources, due to the use of power electronic equipment's and static converters with high switching frequency in their manufacturing technology, are a potential source of voltage and current harmonic contamination. Generally, in the medium voltage cables to reduce and remove electric field, the metallic screen method with single-point, double-point, multipoint earth with the sheath voltage limiter or cross bonding is used. However, use of multipoint earth method with sheath voltage limiter is more efficient than the other methods and reduces the rate of losses in the metallic screen and the number of eddy current loops in the metallic screen circuit, but this method results in increase of harmonic emission in the main conductor voltage of cable. By integrating renewable sources of energy and changing the operating conditions, especially the two-way electrifying of equipment's and increase of the harmonious contamination arising from connection of such resources in micro grids, it is necessary to evaluate the effects of such resources on the performance of sensitive network equipment's such as cables and shields. In this article it has been attempted, first, the matrix parameters of RLC of three-phase cable (monopole) are calculated according to the conduction and insulation features. Then the rate of increase of voltage harmonic contamination in the main conductor of cable is examined by multipoint earthing method and sheath voltage limiter with presence of renewable sources of energy. Also the rate of annual energy losses in the metallic screen is calculated by the two techniques of multipoint earthing equipped to sheath voltage limiter and cross bonding is calculated and compared. Results show that in the multipoint method with sheath voltage limiter the rate of voltage harmonic contamination has increased 55% in the cable main conductor. While, the rate of losses energy in the metallic screen has reduced 71% compared to the cross bonding method. It is necessary to mention that in both methods the amount of the induced voltage in the metallic screen of cable is within the range determined by provisions of 523-0.5-0.1. Simulation for this study has been performed ... in the Matlab/Simulink setting a

کلمات کلیدی:

Harmonic contamination, Metallic screen, Eddy current, harmonic emission, renewable sources of energy

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