
Management of electric facilities and lightning protection

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Abstract

Electric power transmission and distribution network is widely expanded. For its reliable operation, appropriate maintenance and management of natural disaster risk are essential. On the other hand, due to the saturated electric power demand and the recent liberalization of the electric power industry, every possible effort of cost reduction has been made in Japan. In this presentation, research activities for rationalization of maintenance strategy and lightning risk management are introduced. Development of asset management decision support tools for maintenance strategy of power equipment becomes very important to establish rational maintenance strategies and to increase the transparency of cash flow. In order to develop asset management decision support tools, several basic data such as equipment data, operation history data, diagnostic data, are necessary. To promote the research work, the effort to ask the maintenance people in utility companies should be reduced. Along this line, an easy method to diagnose power equipment has to be developed. As one example, estimation method of insulation paper degradation in power transformers from small ones (pole transformers) to large ones (substation transformers) has been introduced. The results of estimating degree of polymerization as an index of mechanical strength deterioration show the method can give acceptable accuracy. The method should be compiled into an new asset management support tools and contribute to reduce the maintenance costs and increase the transparency of cash flow in the maintenance works with the tools. Additionally, the research activities for lightning risk management have been introduced. The process of lightning risk management consists of “Lightning hazard evaluation”, “Lightning risk assessment” and “Lightning risk management”. The lightning hazard evaluation is, to evaluate lightning severity considering lightning frequency, lightning energy and so on. The lightning risk assessment is, to assess loss of damage and its frequency for a given lightning hazard. The lightning risk management is, to determine the best lightning protection scheme considering the cost of protection measures and damage synthetically. Among them, development of a lightning risk assessment program has been introduced.