APPLICATION OF ALIGNMENT DEGREES TO ELECTRIC LOAD CLUSTERING

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ABSTRACT

In distribution system, bus load estimation is complicated because system load is unstable data and usually monitored at only a few points. As a rule receiving nodes are not equipped with stationary measuring instruments so measurements of loads are performed sporadically. In general, the only information commonly available regarding loads, other than major distribution substations and equipment installations, is billing cycle customer kWh consumption or load in per unit (p.u) term. In order to model system uncertainty, inexactness, and random nature of customers demand, an average alignment approach is proposed. This thesis presents application possibilities of the alignment degrees method to the electrical load modeling. Clustering of load profiles in different part of system was used to classify the substations. Simulation studies have been performed to demonstrate the efficiency of the proposed scheme and an effect of different parameters on its accuracy on the basis of actual data obtained at distribution system substations.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Electricity industries all over the world have been using load profiling for many years. Load profiling has been used in electricity industry to provide information for many applications such as for forecasting and tariff formulation. Load profiling is an estimated load shapes that are developed from historical or a current day data. The most significant load data is load shape or also known as load curve.

The knowledge of loads at system buses is one of the most important requirements for efficient operation of power distribution systems [1]. Estimation of loads is the basis for the system state estimation and for technical and economic calculations. This makes possible improvement in operation and maintenance of electrical equipment and in planning of network operating configurations.

The main difficulties in the modeling of loads at receiving buses in distribution systems result from the random nature of loads, diversification of load shapes on different parts of the system, the deficiency of measured data and the fragmentary and uncertain character of information on loads and customers. In the present stage of development of power distribution systems, the mathematical estimation of the loads at the system buses seems to be the most realistic strategy due to incomplete primary information on loads and customers. It demands earlier determination of the stable relations between bus loads and easier available data [1]. The probabilistic models are widely used to estimate system loads. In order to develop the relevant types and parameters of probability distribution, large numbers of recorded consumption values are required. To obtain the above data a special measurement project has to be considered. The use of statistical methods is not always possible due to occurrence of a large deficit of measurements. The fuzzy set theory is a convenient mathematical tool that allows us partially to eliminate unreliability