ABSTRACT

Power industry is a part of the global system to support life. It comprises a number of subsystems whose interactions are effected through the use of direct links and large amount of feedbacks. Application of cybernetical methods to analyse information related processes in power industry would yield useful results. The present investigation deals with the experiments with the applications of cybernetical tools to the five different aspects of the electrical power industry.

For on-line operation of hydroelectric power plant on real time basis it is essential to have an accurate one step ahead estimation of river flow. The present investigation develops the hourly flow simulation technique with the cybernetical method of recursive least square instrument variable algorithm with parameter tracking adaptiveness. Effectiveness of the developed technique has been demonstrated with field data observed at different gauging stations of the hilly river Teesta in North Bengal. On line flow simulation has been done at Coronation Bridge point which has the potentiality of a large hydroelectric plant with an estimated generation capacity of about 1000 MW.

Growth models of Electrical Energy consumption has been developed with gross national product, gross domestic capital formation and other associated variables as exogenous ones. The model has been developed in the form of a polynomial of optimum complexity with the help of the multilayer group method of data handling algorithm.

A desired rate of growth of energy consumption has been assumed. On the basis of this growth rate the trend of energy consumption upto 2000 AD has been extrapolated. The model of energy consumption has been obtained in the form of a polynomial of optimal complexity by computer aided self organisation of mathematical models. A model for energy utilisation factor is also obtained. The models can be used as handy tools for planners of power industry.

State estimation technique provides a powerful tool to obtain a data base for on-line supervision and control of power system. In this work recursive type least square technique is used to obtain the state estimation of the power system parameters. The estimates of the states will help in selecting on-line contingency plan. An illustration is given to show the application of the methods developed.

Dynamic programming technique of applied cybernetics has been used for optimal ordering of nodes for load flow analysis. The illustration shows that the

developed method is capable of improving the computational efficiency of the load flow analysis.

Investigation, carried out in this work, has helped in developing necessary softwares for off-line planning and on-line control of electrical power industry. It also shows that cybernetical methods are powerful tools for analysing the different aspects of electrical power systems.