PREDICTIVE MODELS OF CURRENT, VOLTAGE AND POWER LOSSES ON ELECTRICAL TRANSMISSION LINES

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Abstract

A modern and civilized society is so much dependent on the use of electrical energy, because it has been the most powerful vehicle for facilitating economic, industrial and social developments. Electrical energy produced at power stations is transmitted to load centres from where it is distributed to its consumers through the use of power transmission lines run from one place to another. As a result of the physical properties of the transmission medium, some of transmitted power is lost to the surroundings. The overall effect of power losses on the system is a reduction in the quantity of power available to the consumers. An accurate knowledge of transmission losses is hinged on the ability to correctly predict the available current and voltage along transmission lines. Therefore, mathematical physics expressions depicting the evolution of current and voltage on a typical transmission line were formulated and derived there from the models to predict available current and voltage, respectively at any point of transmission line. The predictive models evolved as explicite expressions of the space variable and they are in close agreement with empirical data and reality. In this study is proposed a mathematical model for predicting available current and voltage and the power losses along a typical transmission line, which is considering the net electric power available to be used to meet customers` demand. In the process, the evolution of current and voltage on the transmission line is studied and modeled to predict both current and voltage that were constructed. Also the desired model for predicting power losses along transmission lines were formulated by reframing the power loss function as a mathematical physic problem. Proceeding in this way, all transmission lines activity can be planned with a view to enhancing the efficiency of the electric power system.

Keywords: *predictive model, transmission line, voltage, current, power losses*