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A New Approach to Reduce the Thermal Modeling Experiment Time by Estimating the Settling Time

Abstract

In order to develop a thermal model for a generator or a motor, several experiments need to be conducted. One of the challenges in conducting the experiment is that it consumes a lot of time to reach its steady state condition. This is because a generator or a motor has a lot of moving parts and a large amount of surface area causes a very slow rise in temperature. This paper proposes a new method to reduce the experimental time by estimating the settling time using a modeling technique used in the control system engineering. From the data presented, the experimental time can be reduced approximately 55 percent. Furthermore, it is also found that the average steady state temperature for the wire winding is 47.55°C and the predicted temperature from the formulated equation is 47.09°C with error less than 1 percent.

Keywords; Black-Box Modeling; Settling Time; Thermal Experiment; Thermal Modeling