Thirty five percent of motor failures are related to stator winding insulation. Therefore, accurate monitoring of the stator winding temperature is crucial for motor protection purposes. Aside from the direct stator winding temperature measurement, the thermal model-based and the motor parameter-based temperature estimation methods are two major techniques for thermal protection.

This research presents an active stator winding temperature estimation technique for soft-starter-connected in-service induction motors. By changing the gate drive signals of the thyristors in the soft starter, a small adjustable dc bias can be intermittently injected to the motor for the estimation of the stator winding resistance. Based on online and continuous monitoring of the stator winding resistance, the stator winding temperature can be monitored using only motor voltage and current. The influence of cable resistance is also studied, and a compensation method is presented. In addition, an Adaptive Neuro Fuzzy Inference System-based technique has been proposed for improving the stator winding temperature estimation accuracy. This technique of stator resistance estimation method can provide remote, sensorless, and accurate thermal protection for soft-starter-connected induction motors.

It is proposed also a new technique to model the stator winding of the induction motor in order to simulate its thermal behavior. This simulation would be useful to study the temperature estimation via the motor parameter-based methods in MATLAB. The modified model is used to validate the remote and sensorless stator winding temperature estimation technique for thermal protection of soft-starter-connected induction motors.