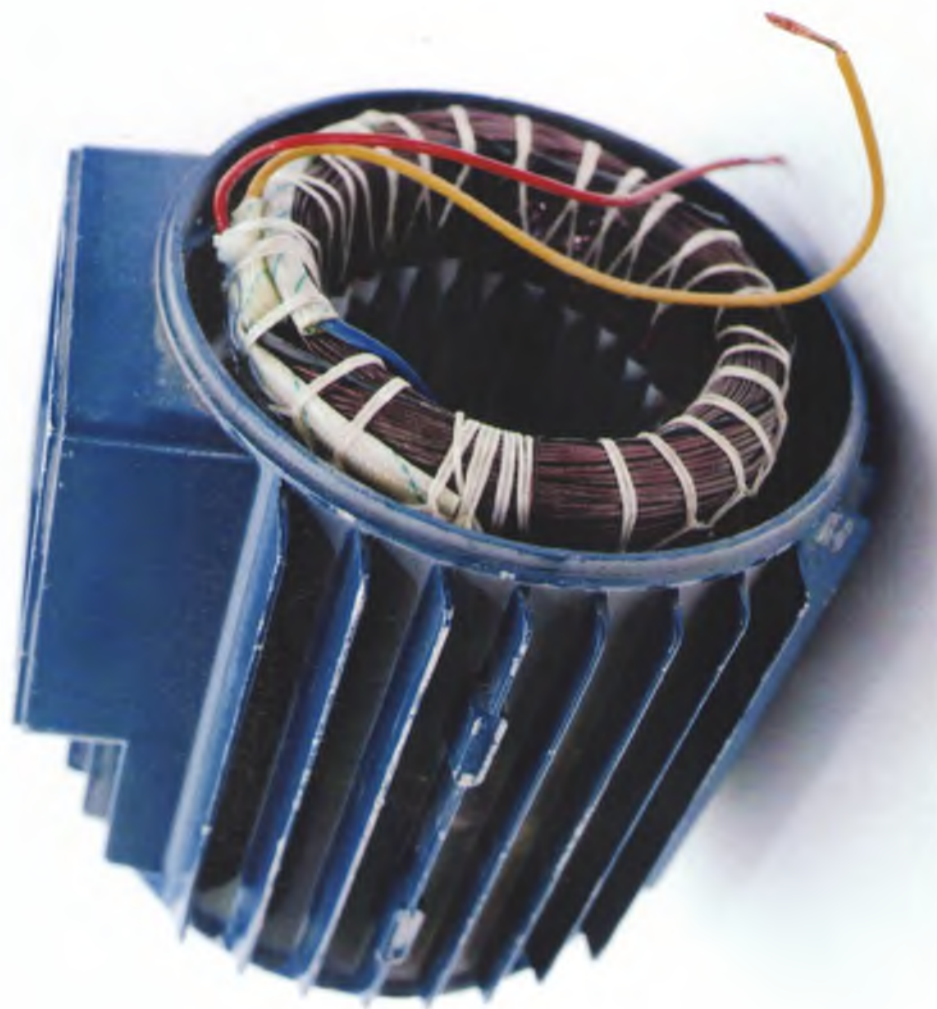


DEVELOPMENT OF DIAGNOSIS METHODS OF ROTOR FAULTS IN INDUCTION MOTORS



Ministry of Science and Higher Education
of the Republic of Kazakhstan

Non-profit joint stock company "Toraighyrov University"

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**DEVELOPMENT OF
DIAGNOSIS METHODS OF
ROTOR FAULTS IN INDUCTION
MOTORS**

Monograph

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The monograph outlines the basics of building systems for diagnostics of squirrel cage rotor of induction motors on induction converters. Modelling methods of currents and magnetic fields are proposed. Designs and algorithms of diagnostics system operation are developed.

The textbook is recommended for students of power engineering specialities of universities.

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The authors and compilers are responsible for the accuracy of the materials,
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Introduction

At electric power plants, the main auxiliary mechanisms are driven by induction motors (IM) with squirrel cage rotor. According to various authors, they account for up to 25-35 % of failures of all auxiliary electric equipment, of which 4.7-10 % are damages of squirrel cage rotor. At the same time, experimental studies conducted at Pavlodar TPP-1 and TPP-3, Ekibastuz SDPP-1 and SDPP-2, as well as Aksu SDPP have shown that the damage rate of squirrel cage rotor IM is much higher.

The damage caused by operation of a motor with a damaged squirrel cage rotor is mainly expressed in increased power consumption. At the same time, the cost of electric power overconsumption for a year of operation in such a motor often exceeds the cost of the motor itself.

Widely known methods of squirrel cage rotor damage detection, which are based on external inspection and vibration of ferromagnetic plate on the surface of partially extended rotor, can be used only when stopping and complete disassembly of the IM. However, they do not always allow detecting the damage and these methods can be used only in the process of motor repair in the presence of a highly qualified specialist.

Proposals on diagnostics of squirrel cage rotor of IM during operation are numerous. Some of them propose to diagnose the motor in special modes, for example, at start-up, reduced voltage and retarded rotor. In others – to measure stator current ripple, active power and motor rotor slip. However, these methods are not widely used due to complexity, cost and low efficiency.

In connection with the above, the development of methods of diagnostics of rod breakage of squirrel cage rotor is timely, and the theme of the work is relevant.

The object of research is auxiliary motors of power plants. The auxiliary motors TPP-1 of Pavlodar are chosen as the basic research site. The subject of the study is damage to the winding of squirrel cage rotor of IM.

The work was carried out in accordance with: scientific directions of working group B4 «Relay Protection and Automation» of the International Conference on Large Power Systems, with the scientific target complex theme «Replacement of traditional current and voltage transformers with new current and voltage sensors; their influence on substation design».

The idea of the work consists in revealing with the help of point induction transducers (PIT) from an external multipole magnetic field of IM a magnetic field with one pair of poles that is a characteristic sign of presence of a damaged rod and allows carrying out diagnostics of a condition of a short-circuited rotor winding in an arbitrary mode of operation.

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