

Rotor temperature sensing with inductive power supply via an externally excited synchronous machine

Background

Rotor temperature, which is calculated indirectly on the basis of rotor resistance, is an important motor parameter. For motors with inductive energy transfer to the rotor, measuring the rotor resistance without an additional sensor, etc. on the rotor is very problematic.

Problem

In systems, where electric power is transmitted inductively to the load, parameter measurements of components located on the side of the load are sometimes problematic. Since there is no direct link to these components, only sensors with contactless data transmission can be used for these measurements. However, such sensors cannot easily ensure reliable measurement, especially at high temperatures, moving transmitters or receivers, and/or external interference fields. Particularly in power electronics and in electric motors whose excitation windings have an inductive power supply, monitoring the rotor temperature is extremely important to prevent destruction of the system by overheating.

Solution

The present invention relates to a method for temperature sensing of a load/rotor (R_{Rotor}), in a resonant system, wherein the load is supplied with energy via an inductive energy transmission system. The invention describes a non-contact measurement method which evaluates the frequency change in the primary side of the autoresonant circuit which ensures contactless rotor power supply. The primary resonant circuit is excited by an excitation voltage (or current) at an excitation frequency that corresponds to the resonant frequency of the resonant system. The resonant frequency of the load depends on the resistance (R_{Rotor}).

The temperature of the load is determined based on the applied excitation frequency of the excitation voltage or current of the primary resonant circuit.

Contact

Dipl.-Ing. Emmerich Somlo
TLB GmbH
Ettlinger Straße 25
76137 Karlsruhe | Germany
Phone +49 721-79004-0
somlo@tlb.de | www.tlb.de

Development Status

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Patent Situation

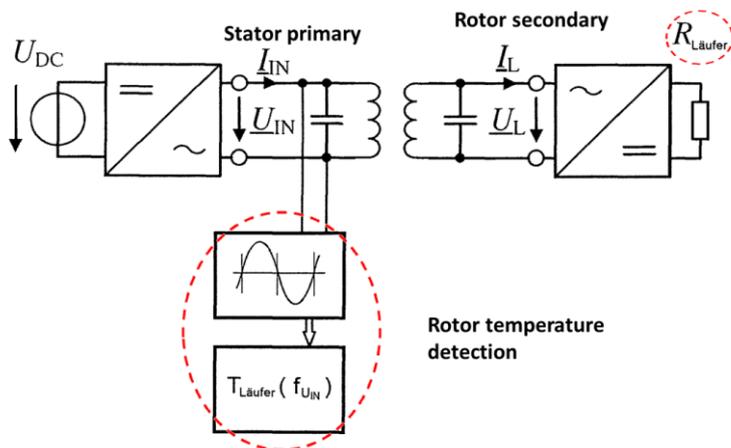
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Service

Technologie-Lizenz-Büro GmbH has been entrusted with the exploitation of this technology and assists companies in obtaining licenses.



Equivalent circuit diagram of a system suitable for operating an externally excited synchronous machine with contactless rotor power supply. [Fig. Marcel Maier, IEW, University of Stuttgart]

Advantages

- Enhanced reliability of externally excited synchronous machines with inductive power supply, as no additional sensors (on the rotor or outside) are required
- Less maintenance
- Significant cost savings

Fields of application

Contactless rotor temperature measurement in an externally excited synchronous machine (EESM) with inductively (contactless) excited rotor.