FAKULTA
ELEKTROTECHNICKÁ
ZÁPADOČESKÉ
UNIVERZITY
V PLZNI

2011

**Pracoviště:** Regional Innovation Centre for Electrical Engineering

**Výzkumná zpráva č.:** 22190 - 007 - 2011

# Thermal model of 50kW synchronous machine

**Druh úkolu:** scientific research

**Řešitelé:** Ing. Roman Pechánek

**Vedoucí úkolu:** Doc. Ing. Bohumil Skala, Ph.D.

**Počet stran:** 21

**Datum vydání:** may 2011

**Revize:** 1

This work has been supported by project CZ.1.05/2.1.00/03.0094.

# Annotation

This report is focused to thermal calculation and „Matlab - Simulink“ model of the machine, which has been designed and calculated in report no. 22160 – 003 – 2011, 22160 – 004 – 2011, 22160 – 005 – 2011 and 22160 – 006 – 2011.

„Matlab – Simulink“ model is based on a lumped-parameters thermal model. Thermal model provides results of transient thermal analysis. The model is sufficiently complex to identify the temperatures at most locations in the machine, including the peak temperatures in the stator winding and the rotor excitation winding. It is formulated out of purely dimensional information and constant thermal coefficients and is therefore easily adapted to a range of frame size. The thermal behaviour of the synchronous machine is accurately described by the solution of just five linear differential equations and one linear equation. The model is therefore suitable for application to online temperature estimation for protection and duty – cycle evaluation.