Master thesis

Modeling of oil flow in power transformers

ABB Corporate Research, Västerås

Start spring semester 2005

In a power transformer, the cooling is provided through circulation of oil between ducts in the active parts and heat exchangers outside the transformer tank. The oil circulation is due to free convection or combined free and forced convection. In the design of power transformers, it is of interest to minimize the size of heat exchangers and internal cooling ducts.

Calculation of temperature and flow distribution can be done with CFD, with thermal network modeling, and with empirical correlations. In the daily design work, however, thermal network modeling is commonly used.

The master thesis should focus on comparison of temperature and flow distribution calculated with CFD and with thermal network modeling for a simplified transformer model.

It is desired that the student has taken advanced courses in heat transfer and fluid mechanics. Knowledge of numerical methods and CFD is an advantage.

Notes from Chalmers (from communication with ABB):

The student will work in a project together with a group of about 3-4 people at ABB. The student project will be more academic than the rest of the project.

The student will mainly work at ABB in Västerås, but may also work some time at Chalmers. ABB will arrange a place to stay in Västerås.

It is desireable that the student takes both the courses MTF071 Computational Fluid Dynamics of Turbulent Flow and MTF112 Convective heat transfer in addition to basic courses in fluid dynamics and turbulence. The project will involve the use of a commercial CFD-code such as Fluent, which is introduced in MTF112.

Contact assistant Professor Håkan Nilsson, hani@tfd.chalmers.se, 031-772 1414 if you are interested.