

Master thesis

Modeling of air flow in radiators for power transformers

ABB Corporate Research, Västerås

Start at end of spring semester 2006

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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. When radiators are used as heat exchangers, both oil flow and air flow is due to free convection. In the design of power transformers, it is of interest to minimize the cost and size of heat exchangers.

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 focus of the master thesis should be calculations of temperature and flow distribution for the air side of a radiator duct. The duct consists of two vertical wide walls with heat transfer and inlet boundaries at the remaining four sides. Three-dimensional CFD models should be setup using FLUENT.

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.