

Master thesis

## **Modeling of oil flow in power transformers**

ABB Corporate Research, Västerås

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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. 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 internal cooling ducts and to avoid stagnant regions with poor cooling.

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 inlet region of a disc winding. In this region, oil is distributed between several parallel horizontal ducts, and the flow characteristics depend on the geometry as well as on inertia and buoyancy effects. Two-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.