

## Numerical Investigation of Fluid Flow and Temperature Distribution on Power Transformer Windings Using Open Foam

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**Abstract :** The goal of this article is to investigate the detailed temperature distribution and the fluid flow of an oil cooled winding of a power transformer by means of computational fluid dynamics (CFD). The experimental setup consists of three passes of a zig-zag cooled disc type winding, in which losses are modeled by heating cartridges in each winding segment. A precise temperature sensor measures the temperature of each turn. The laboratory setup allows the exact control of the boundary conditions, e.g. the oil flow rate and the inlet temperature. Furthermore, a simulation model is solved using the open source computational fluid dynamics solver OpenFOAM and validated with the experimental results. The model utilizes the laminar and turbulent flow for the different mass flow rate of the oil. The good agreement of the simulation results with experimental measurements validates the model.

**Keywords :** CFD, conjugated heat transfer, power transformers, temperature distribution

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