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HYBRID NUMERICAL SIMULATIONS OF A SCALED-DOWN SIMPLIFIED MODEL OF A TRANSFORMER COOLING SYSTEM

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FINAL ABSTRACT

Numerical investigations of a scaled-down and simplified physical model of a transformer cooling system are presented. This physical model consists of a closed-loop thermosyphon with heating and cooling sections, and connecting pipes. Distilled water is the operating fluid. The possibilities for cost-effective simulations offered by two approaches are explored: 1) a hybrid approach (based on a combination of segmented quasi-one-dimensional and detailed multidimensional mathematical models, solved numerically) for the simulation of steady-state conditions; and 2) a mathematical model based on a simple lumped-parameter approach for estimating overall unsteady system behavior following an imposition of a step-change in the handled power. The numerical results compare quite favorably with those of a complementary experimental investigation.