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THERMAL PERFORMANCE EVALUATION OF DELTA-WING VORTEX GENERATORS APPLIED TO COOL POWER TRANSFORMER RADIATORS

Gustavo A. Ríos Rodriguez[1], **Luciano Garelli**[1] **and Mario Storti**[1]

[1] *Centro de Investigación de Métodos Computacionales (CIMEC)-UNL/CONICET, Predio CONICET Santa Fe, Colectora Ruta Nac. 168, Km 472, Paraje El Pozo, Santa Fe, Argentina, e-mail: gusadrr@santafe-conicet.gov.ar - http://www.cimec.santafe-conicet.gov.ar*

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Abstract. In this research both experimental studies as well as thermo-fluid dynamic simulations regarding the performance of delta-wing vortex generators to cool the external surface of radiator fins are carried out. The numerical simulations are realised with Code Saturne which is a multiphysics parallel code. In this manner, the governing equations for buoyancy-driven turbulent flows and the natural convection heat transfer are solved. On the other hand, experimental studies are carried out on a test bench which has geometrical characteristics similar to those encountered in power transformer radiators. Arrays of delta-wing vortex generators were manufactured and attached to the panel surface, and the temperature changes at specific locations on the panel as well as the air temperature and velocity distributions downstream of the vortex generators are measured. These data are compared to those obtained in the numerical simulations and are used to evaluate local and global heat transfer enhancements from the panel to the air. The influence of several parameters are taken into account in the study, like the vortex generators angle of attack, the clearance distance from the trailing edge to the panel surface and the distance from one vortex generator array to another.

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