

Mateusz Korpyś MSc., BSc.

Abstract of the PhD Thesis „Analysis of heat transfer in chosen systems during nanofluids CuO – water flows”

This thesis describes analysis of heat transfer in chosen systems using CuO - water nanofluids. The researches were conducted on the coil, the computer cooling CPU block and the annular duct. Calculations were performed using CFD (Computational Fluid Dynamics) methods. The results of the simulations were compared with experimental data. CFD analysis were performed for laminar and turbulent flow, the $k - \epsilon$ *Realizable* model was used for turbulence. In all investigated cases, the single-phase flow model was applied.

For the coil nanofluid containing 0,869 vol. % of CuO was tested. On the basis of CFD results it has been found that the use of nanofluid in comparison to pure water did not improved heat transfer. The values of Nusselt number for water and nanofluid were similar.

The CPU cooling was carried out for nanofluids CuO-water at two solid concentrations of 0.86 and 2.25 vol.%. The CPU temperature was lower by approximately 0.5 K in comparison to water cooling.

The calculations of heat transfer in the annular duct were carried out for the co-current and counter-current flow. Nanofluids containing 0.61; 0.86 and 1.82 vol. % CuO were investigated. Any significant improvement of heat transfer using nanofluids were not observed. Similar results were obtained for co-current and counter-current flow.

9.12.2016 M. Korpyś