

- Research Title:** Heat transfer characteristics of a vapor chamber with loop tube condenser using copper nano-water mixture as working fluid
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- Source of Fund:** Coordinating Center for Thai Government Science and Technology Scholarship Students (CSTS), Ministry of Science and Technology, and National Science and Technology Development Agency (NSTDA).

### Abstract

The objective of this research is to study on thermal performance of vapor chamber with loop tube condenser (TC). A condenser of conventional vapor chamber (CC) was modified by attach the loops tubes for improving of heat transfer coefficient on air side. Thermal performance of CC and TC was compared with operation by pure water as working fluid. A special test rig for tests of the thermal performance of CC or TC was setup. In during tests, temperatures ( $T_j$ ) that supplied to evaporator were varied in the range of 80, 90 and 100 °C. The air velocity ( $V$ ) that flow across the condenser was also varied of 1.0, 1.4 and 1.8 m/s. Finally, thermal resistance of the vapor chamber with copper nano-water mixture as working fluid was experimentally investigated.

Results, the maximum heat transfer rate of both vapor chambers with water as working fluid were 19.98 and 77.50 W, respectively. The heat transfer rate of both vapor chambers increased with  $T_j$  and  $V$ . The small tubes are installed on condenser can reduce the thermal resistance by 75 %. In conclusion, the use of nano copper powder with water instead of water as the working fluid in the TC found that the 32.13% average decrease in  $R_t$ .

**Key words:** vapor chamber, heat sink, loop condenser, cooling