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| Thesis Title | Performance Studies on Evaporation and Condensation of a Thermosyphon Heat Pipe |
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| Candidate | Mr. Santi Wangnipparnto * |
| Supervisors | Assoc. Prof. Dr. Tanongkiat Kiatsiriroat |
| | Mr. Mana Amornkitbamrung |
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## Abstract


This paper describes experimental studies on evaporation and condensation phenomena of a thermosyphon heat pipe. The thermosyphon heat pipe filled with water was made of a copper tube with outside diamater of 2 cm and 81 cm long and could be adjusted at different inclination. The heat pipe was with hot oil temperature at the lower part ("heating zone" or "evaporator") and was cooled with water at the upper part ("cooling zone" or "condenser"). Between these two zones, the pipe was well insulated and this part was called the "transport zone".

In this study, the parameters which affected the performance of heat pipe were determinded. They were the fill ratio of the working fluid (F) in the pipe which was the ratio of the liquid water volume at room temperature with the inner total volume, the inclination angle from horizontal ($\beta$), the ratio of the transport length and the total tube length (La) and the operating temperature of the hot oil ($T_{oi}$) and the cold water ($T_{wi}$) at the evaporating and condensing sections, respectively. Moreover empirical expressions for heat transfer coefficients at the boiling and condensation sections were also developed.

The experimental results showed that lower thermal resistance at the condensation section was obtained with lower fill ratio, F, and smaller inclination angle, $\beta$. The suitable values of F and $\beta$ sumed to be 30% of the evaporator length and 22.5°, respectivity. In the case of the evaporation side, it was found that smaller the value of La, resulted in lower thermal resistance of the evaporation section. The total thermal resistance was lowest when the value of La was zero. The total thermal resistance of the heat pipe and the temperature profiles were not strongly affected by the oil temperature $T_{oi}$.

The mathematical expressions to evaluate the heat transfer coefficients between the inner tube wall and the water inside at the evaporation and the condensation sections were developeed which were given in eqns (5.11) and (5.14), respectively. The experimental data could be filled with the equation with ±15% deviation.

Keywords : Thermosyphon heat pipe / Evaporation / Condensation / Transport zone / Mathematical modelling / Heat transfer coefficient / Thermal resistance