

Loop Heat Pipe Two-Phase Heat Transports: Guidelines for Technology Utilization

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Abstract : Loop heat pipes (LHPs) are two-phase capillary-pumped heat transports. An appropriate working fluid is selected for the intended application temperature range. A closed-loop is evacuated to a high vacuum, back-filled partially with the working fluid, and then hermetically sealed under the fluid own pressure. Heat from a heat source conducts through the evaporator casing to vaporize liquid on the outer surface of the wick structure inside the evaporator. The generated vapor is compelled to vent out of the evaporator and into the vapor line for transport to the condenser assembly. There, heat is removed and rejected to a heat sink to condensed vapor back to liquid. The liquid exits the condenser and travels in the liquid line to return to the evaporator to complete the cycle. The circulation of fluid, and thus the heat transport in the LHP, is accomplished entirely by capillary action. The LHP contains no mechanical moving part to wear out or break down and, therefore possesses, reliability and a long life even without maintenance. In this paper, the author not only attempts to introduce the LHP technology in simplistic terms to those who are not familiar with it but also provides necessary technical information to potential users for the proper design and analysis of the LHP system.

Keywords : two-phase heat transfer, loop heat pipe, capillary pumped technology, thermal-fluid modeling

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