OPTIMIZE LIMITATIONS IN A HEAT PIPE BY VARYING FLUID PROPERTIES AND WICK STRUCTURES

OVERVIEW

A heat pipe is a high heat flux, passive heat transfer device which uses the evaporation, condensation, and surface tension of a working fluid to attain an extremely high thermal conductivity. Broadly speaking, in terms of a heat pipe, the vapour flow from the evaporator to the condenser is caused by the vapour pressure difference. Meanwhile the liquid flow from the condenser to the evaporator is produced by the forces, such as capillary force and gravitational force. Regardless of the orientation of the heat pipe the basic principles are the same. Hence it is effective to enhance the heat transfer by concentrating on the optimum flow of evaporated vapour and condensed liquid.

OBJECTIVES

The main objectives of heat pipe design has been focused on

- high performance
- light weight
- low cost

Methodology for above thesis work can be summarized as follows:

- Establish laboratory facilities for heat pipe fabrication and testing.
- Specifications of the Heat Pipe

    Grooved type wick: Depending on the shape of the grooves, there is a difference in performance. Manufacturing costs are low with this type of heat pipe because the grooves are easier to make, however the technique is much more susceptible to gravity and can be orientation specific in use.

    Micro groove: Miniature heat pipes with micro axial grooves can be successfully used in electronic components cooling systems.

    Flat heat pipe (FHP): FHP increases in the maximum heat load capacity.

Nano fluids: Fluid consist of various nano particle for increasing the effectiveness of the heat pipe.

- Perform tests regarding the heat transfer efficiency and temperature characteristics of heat pipes.
- To determine the efficiency of the heat pipe at varying fluid properties.
- To determine the efficiency of the heat pipe at varyingwick structure (multiple layers) and wick bed alignment.
- Validate experimental results using computational analysis.

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