UNEVEN TURN OSCILLATING HEAT PIPES

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Abstract

An experimental investigation on oscillating heat pipes with uneven turns was conducted in order to determine the effect of short turns on the heat transport capability. The shorter turns do not go through both the evaporating and condensing sections; the short turns were placed only in the evaporating section. The design of the OHP consists of 14 long turns which run from the evaporator to the condenser and 6 short turns were placed only on the evaporating section. An extensive experimental investigation on the effects of the input power, tilted angle, condensing temperature, and charging ratio was conducted. Experimental results show that for all test conditions, the OHP functions very well and it can transport an input power up to 1200 W and can reach a thermal resistance of $0.028^{\circ}C/W$. From the experimental results of tilted angle effect, it can be found that the heat pipe is almost independent of the tilted angle. Most importantly, it is shown that with a number of short turns placed on the evaporating section, the OHP can operate efficiently without the assistance of the gravitational force. In other words, the heat pipe developed herein can operate at a condition of the heating section on the top and the cooling section on the bottom with a distance of 18.5 cm from the center of the evaporator section the center of the condensing section. In addition, the results show that the heat transfer performance depends on the operating temperature and charging ratio. When the operating temperature increases, the heat transfer performance of the OHP investigated herein significantly increase.