| | |
|---|---|
| $K_p$ | Kutateladze number |
| L | reference length, m |
| $L_c$ | condenser length, m |
| $L_e$ | evaporator length, m |
| $L_{eff}$ | effective length, m |
| $L_t$ | overall length of the heat pipe, m |
| $m_1$, $m_2$, $m_3$, $m_4$ | constants in Eq. (25) |
| $N_g$ | number of grooves |
| Nu | Nusselt number |
| p | perimeter, m |
| P | precision limit contribution |
| $P_o$ | Poiseuille number |
| $P_{sat}$ | saturation temperature, Pa |
| Q | heat input power, W |
| $q_c$ | heat flux at the condenser section, W/m² |
| $q_{ev}$ | heat flux at the evaporator section, W/m² |
| r | gaz constant, J/kg.K |
| $R_1$ | thermal resistance due to thermal conduction through the evaporator wall, K/W |
| $R_2$ | thermal resistance due to evaporation, K/W |
| $R_3$ | liquid-vapor interfacial thermal resistance, K/W |
| $R_4$ | thermal resistance due to the exchanges between the vapor and the heat pipe wall, K/W |
| $R_5$ | liquid-vapor interfacial thermal resistance, K/W |
| $R_6$ | thermal resistance due to condensation, K/W |
| $R_7$ | thermal resistance due to thermal conduction through the condensation wall, K/W |
| $R_8$ | thermal resistance due thermal conduction along the heat pipe, K/W |
| $r_c$ | capillary radius, m |
| Re | Reynolds number |
| $R_{th}$ | heat pipe overall thermal resistance, K/W |
| $R_{tha}$ | thermal resistance of the adiabatic zone, K/W |
| $R_{thc}$ | condenser thermal resistance, K/W |
| $R_{thcond}$ | thermal resistance of condensation, K/W |
| $R_{thev}$ | evaporator thermal resistance, K/W |
| $R_{thevap}$ | thermal resistance of evaporation, K/W |
| $R_{thwallc}$ | thermal resistance of the condenser wall, K/W |
| $R_{thwallev}$ | thermal resistance of the evaporator wall, K/W |
| $S_g$ | groove spacing, m |
| $\overline{T}_{ad}$ | average temperature of the adiabatic zone, °C |
| $\overline{T}_c$ | average temperature of the condenser, °C |
| $\overline{T}_{ev}$ | average temperature of the evaporator, °C |
| $T_f$ | film temperature, °C |
| $T_{hs}$ | heat sink temperature, °C |
| $T_w$ | wall temperature, °C |
| $T_{sat}$ | saturation temperature, °C |
| $t_w$ | wall thickness, m |
| $W_{gb}$ | width at the base of the groove, m |
| $W_{gt}$ | width at the top of the groove, m |
| $x_o$ | constant defined by Eqns. (40) and (41) |

**Greek symbols**

| | |
|---|---|
| $\alpha$ | angle defined in Figure 2, ° |
| $\beta$ | angle defined in Figure 2, ° |
| $\Delta h_v$ | latent heat of vaporization, J/kg |
| $\Delta P_c$ | capillary pressure, Pa |
| $\Delta P_g$ | hydrostatic pressure, Pa |
| $\Delta P_l$ | liquid pressure loss, Pa |
| $\Delta P_v$ | vapor pressure loss, Pa |
| $\Delta\overline{T}_c$ | average temperature difference between the condenser and the adiabatic sections, K |
| $\Delta\overline{T}_{ev}$ | average temperature difference between the evaporator and adiabatic sections, K |
| $\Delta\overline{T}_{hp}$ | average temperature difference between the evaporator and condenser sections, K |
| | angle defined in Figure 3, ° |
| $\theta$ | contact angle, ° |
| $\lambda$ | thermal conductivity, W/m.K |
| $\mu$ | dynamic viscosity, kg. $m^{-1}.s^{-1}$ |
| $\nu$ | kinematic viscosity, m/s² |
| $\rho$ | density, kg/$m^3$ |
| $\sigma$ | surface tension, N/m |
| $\varphi$ | porosity |

**Subscripts**

| | |
|---|---|
| ad | adiabatic |
| c | condenser, condensation |
| cond | condensation |
| e | evaporator |
| ev | evaporator, evaporation |
| evap | evaporation |
| g | groove, hydrostatic |
| gb | groove bottom |
| gt | groove top |
| hp | heat pipe |
| hs | heat sink |
| i | inner |
| l | liquid |
| max | maximum |
| o | outer |
| sat | saturation |
| t | overall |
| v | vapor |
| w | wall |