Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Experimental Analysis of the Effects of Inclination Angle and Working Fluid Amount on the Performance of a Heat Pipe[1] MAHBOOBE MAHDAVI, SAEED TIARI, Mechanical Engineering Department, Gannon University, Erie, PA, SONGGANG QIU, Department of Mechanical and Aerospace Engineering, West Virginia University, Morgantown, WV — Heat pipes are two-phase heat transfer devices, which operate based on evaporation and condensation of a working fluid inside a sealed container. In the current work, an experimental study was conducted to investigate the performance of a copper-water heat pipe. The performance was evaluated by calculating the corresponding thermal resistance as the ratio of temperature difference between evaporator and condenser to heat input. The effects of inclination angle and the amount of working fluid were studied on the equivalent thermal resistance. The results showed that if the heat pipe is under-filled with the working fluid, energy transferring capacity of the heat pipe decreases dramatically. However, overfilling heat pipe causes over flood and degrades heat pipe performance. The minimum thermal resistances were obtained for the case that 30% of the heat pipe volume was filled with working fluid. It was also found that in gravity-assisted orientations, the inclination angle does not have significant effect on the performance of the heat pipe. However, for gravity-opposed orientations, as the inclination angle increases, the temperature difference between the evaporator and condensation increases and higher thermal resistances are obtained.

[1]Authors appreciate the financial support by a research grant from Temple University

Mahboobe Mahdavi
Mechanical Engineering Department, Gannon University, Erie, PA

Date submitted: 01 Aug 2016 Electronic form version 1.4