IX Minsk International Seminar "Heat Pipes, Heat Pumps, Refrigerators, Power Sources",
Minsk, Belarus, 7–10 September, 2015

OPERATIONAL CHARACTERISTICS OF A REVERSE-LOOP THERMOSYPHON WITH A LARGE PREHEAT ACCUMULATOR

Meng-Chang Tsai[1], Fong-Hao Wu[1], Wei-Chun Liao[1], Wei-Chi Su[1], Heng-Yi Li[1], Wen-FaTsai[1], Shung-Wen Kang[2]

[1]Institute of Nuclear Energy Research
1000, Wenhua Rd., Jiaan Village, Longtan, Taoyuan, 32546 Taiwan, ROC
Tel. : + 886-3-4711400 ext 7440, Fax: +886-3-4711408
E-mail: channingtsai@gmail.com

[2]Department of Mechanical and Electro-Mechanical Engineering, Tamkang University
151, Ying-Chuan Rd., Tamsui, Taipei, 25137 Taiwan, ROC
Tel. : + 886-2-26215656 ext 2613, Fax: +886-2-26209745
Email: swkang3114@gmail.com

Abstract

In this study, we fabricateda reverse-loopthermosyphon (RLT) with a large preheat accumulator foreffectively andstably moving thermal energy downwards to a constant temperature liquid-cooled heat exchanger.The RLT is a passive device, such as a heat pipe without a wick structure and valves, driven by thermal energy and possessesextremely high thermal conductivity.This study analysed the operationof an RLT and obtained thepressure versus heat fluxgraph. The heated portion is 1.1 m higherthan the cooled portion, and a 95% concentration of ethanol liquid with 45% fill ratios was used as the working fluid inside the thermosyphon loop. The experiment used nine power inputs to observe the temperature variation with time.Given an actual heating flux of 27.33 kW/m^2, the steady temperature of the heat source was approximately 147°C, the liquid-cooled heat exchangerhad a steady temperature of 30°C, and the thermal resistance was 0.26°C/W. This study successfully predicted the pressure inside the RLT; the minimum startup accumulator pressure mustbe higher than 0.2 kg/cm^2.