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Experimental Investigation of Heat Transfer on Vertical Two-Phased Closed Thermosyphon

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Abstract : Heat pipe is considered to be applied as a passive system to remove residual heat that generated from reactor core when incident occur or from spent fuel storage pool. The objectives are to characterized the heat transfer phenomena, performance of heat pipe, and as a model for large heat pipe will be applied as passive cooling system on nuclear spent fuel pool storage. In this experimental wickless heat pipe or two-phase closed thermosyphon (TPCT) is used. Variation of heat flux are 611.24 Watt/m² - 3291.29 Watt/m². Variation of filling ratio are 45 - 70%. Variation of initial pressure are -62 to -74 cm Hg. Demineralized water is used as working fluid in the TPCT. The results showed that increasing of heat load leads to an increase of evaporation of the working fluid. The optimum filling ratio obtained for 60% of TPCT evaporator volume, and initial pressure variation gave different TPCT wall temperature characteristic. TPCT showed best performance with 60% filling ratio and can be consider to be applied as passive residual heat removal system or passive cooling system on spent fuel storage pool.

Keywords : two-phase closed term syphon, heat pipe, passive cooling, spent fuel storage pool
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