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# C1Po3A-05: Experimental study of two thermally-connected hydraulically- independent 20-tube neon pulsating heat pipes working in parallel

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In view of cryocooler-dependent dry cooling of superconducting magnets and systems, efficient heat transfer devices that can function independent of the gravity effect are in high demand. One of the recent candidates gaining popularity are cryogenic pulsating heat pipes (PHP), synonymously called as oscillating heat pipes. These wickless heat pipes, made by simply meandering capillary tubes, have illustrated the potential to function in different orientations not only in space but in earth-bound applications as well.

Cryogenic PHPs are still devoid of their first practical application. PHPs are largely dependent on multiple geometric and operational parameters. The precise impact of each of these parameters on the PHP thermal performance is not entirely understood owing to the complexities in experimental measurement at low temperatures and absence of fully-developed numerical prediction tools. So as to favour implementation of cryogenic PHPs is a real application, our laboratory has been involved in creating large experimental data set while investigating different study aspects.

One such study presented here is the thermal performance of two neon PHPs having the same cold source. Same cold source implies that the two PHP condensers are thermally connected to a single cryocooler. The two PHPs are geometrically identical having an inner tube diameter of 1.0 mm and 20 number of parallel tubes with a projected length of 0.4 m. The PHP tubes are made of stainless steel and the evaporator and condenser part are made of copper. Heat load on each of the PHP evaporator can be separately controlled. Moreover, the gas supply system for both PHPs is also separate thereby making the two PHPs hydraulically independent. Temperature and pressure time evolution plots for two neon PHPs working in parallel has been presented for a filling ratio of 40% in each of the PHPs. Thermal performance comparison with that of a single neon PHP under same working conditions is also reported in terms of thermal resistance.

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