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## **C1Or1C-04: An experimental investigation on finned heat exchangers with cryogenic helium oscillating flow**

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The space-cycle averaged Nusselt number is used to characterize the heat transfer process of cold end heat exchanger in cryocoolers working with cryogenic helium oscillating flow. An experimental setup for cryogenic oscillating flow heat transfer measurement is designed and established to simulate actual operating conditions of cold-end heat exchanger of a regenerative refrigerator. The operating temperature range is set from 80 K to 20 K. The combination of liquid nitrogen pre-cooling and G-M refrigeration is introduced to meet the requirements of low temperature operation and accurate temperature control. Results show that the Nusselt number increases with the increase of maximum Reynolds number of the oscillating flow, which is consistent with situations at room temperature. The variation of Nusselt number with temperature is presented to have an intuitive perspective on the difference in heat transfer performance caused by dramatic change in thermophysical properties, which is induced by temperature drop. It is evident that lower temperature is significantly disadvantageous for heat transfer in oscillating flow field. In the future work, emphasis will be put on to introduce non-dimensional criterion as the key heat transfer indicator for design optimization of the cold-end heat exchangers for cryocoolers.

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