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Experimental investigations on chill down along packed spherical bed regenerator

Content :

Regenerative heat exchangers are widely used in cryogenic applications like stirling, pulse tube cryocoolers and magnetic refrigerators. In all these applications the performance of the regenerators depends on viscous loss and thermal effectiveness. An experiment setup has been formulated for studying the chill down characteristics and heat transfer effectiveness. In the present paper, packed beds of stainless steel were used as regenerator material. The outer surface of the regenerator is insulated with nitrile rubber. The stainless steel balls are packed to porosity 0.47. Liquid nitrogen at 77K is used as cryogenic fluid. Experiments are conducted for three different mass flows corresponding to inlet pressures 7.5psi, 10psi and 12psi for evaluating the effect of inlet pressure on heat transfer characteristics. The regenerator material is initially assumed to be at room temperature and chill down characteristics at different flow rates are also investigated.

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