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Optimization of magnetic refrigerators by tuning the heat transfer medium and operating conditions. MOHAMMADREZA GHAHREMANI, AMIR ASLANI, LAWRENCE BENNETT, EDWARD DELLA TORRE, George Washington Universoty — A new reciprocating Active Magnetic Regenerator (AMR) experimental device has been designed, built and tested to evaluate the effect of the system's parameters on a reciprocating Active Magnetic Regenerator (AMR) near room temperature. Gadolinium turnings were used as the refrigerant, silicon oil as the heat transfer medium, and a magnetic field of 1.3 T was cycled. This study focuses on the methodology of single stage AMR operation conditions to get a higher temperature span near room temperature. Herein, the main objective is not to report the absolute maximum attainable temperature span seen in an AMR system, but rather to find the system's optimal operating conditions to reach that maximum span. The results of this work show that there is an optimal operating frequency, heat transfer fluid flow rate, flow duration, and displaced volume ratio in an AMR system. It is expected that such optimization and the results provided herein will permit the future design and development of more efficient room-temperature magnetic refrigeration systems.

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