Influence of Regenerator Current Plate Layout and Inlet and Outlet Port Configuration on GM Refrigerator Performance: a CFD Study

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In this paper, the first stage regenerator of a two-stage GM refrigerator whose performance is mainly dependent on the regenerator is numerically studied. Regenerator is an important part of refrigerator, which has important influence on the cooling effect of refrigerator. In this current work, CFD solutions have been selected for numerical purposes. The cooling behavior, heat transfer at the cold and internal pressure change of regenerator are analyzed in detail by using FLUENT. To change regenerator current plate layout position, other parameters remain the same. The cylinder regenerator with a length of 106mm and an internal diameter of 72.5mm with a working frequency of 1Hz for all cases did not change all cases. The results show that there is an optimal position of current plate for wire mesh regenerator. The change of internal pressure is also analyzed. The structure of inlet and outlet ports was changed to obtain the relevant temperature distribution and pressure drop curve under the condition of 1Hz, pressure 2MPa and flow 4g/s. To get an optimum parameter experimentally is a very tedious for GM refrigerator job so the CFD approach gives a better solution which is the main purpose of the present work.