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CFD simulation and optimization of a 10K VM refrigerator

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The VM refrigerator with power being supplied by liquid nitrogen shows great potential for development below 10K. The 2D axisymmetric model refers to actual geometry under oscillating flow conditions is carried out using FLUENT software. The coldest temperature, the pressure in three cavities, the temperature profile along the regenerator, and the overall cooling power are present. The simulation results show good agreement with available data. Then the regenerator between cold with middle cavity is optimize to obtain the coldest temperature, it is filled with stainless steel screens and lead shot. It is found that there exists the best ratio of stainless steel screens and lead in the same length regenerator.

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