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# A numerical model of multi-layered regenerator for a prototyped magnetic refrigerator

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Magnetic refrigerators have emerged as an important trend in the refrigeration industry. They are believed to be more efficient than current and popular cooling systems by approximately 50%. The underlying principles of magnetic refrigerators are the thermodynamics laws of changing in temperature associated with magnetization and demagnetization of a magnetic regenerator. A numerical model of heat exchange between the magnetic materials and fluid is capable of explaining the temperature span, coefficient of performance (COP), for example. It can also clarify the influences of various variables effecting to magnetic refrigerator, such as mass flow rates, magnetic solid geometries, and arrangements of the magnetic materials. A numerical model has been developed to study a multi-layered and parallel plated active magnetic regenerator (AMR), where each layer has different Curie temperatures. The model is aimed at calculating temperature spans and COPs in order for the further optimization of layer lengths and types of layers. The implicit Euler method of finite difference is used in solving relevant coupled heat equations subjected to reasonable initial and boundary conditions. The results are then compared with data derived from common refrigerator systems.

**Primary author:** Mr TULYAPRAWAT, Jirat ( Kasetsart University)

**Co-authors:** Dr TECHAPIESANCHAROENKIJ, Ratchatee (Kasetsart University); Dr HANLUMYUANG, Yuranan (Kasetsart University)

**Presenter:** Mr TULYAPRAWAT, Jirat ( Kasetsart University)

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