Simulation of a magnetocaloric heating network

The concept and methodology of a magnetocaloric heating network is proposed. A small thermal network consisting of several magnetocaloric heat pumps (MCHP) is considered from the point of their scaling and connection properties. We found a linear scaling law following the heating power variation with AMR mass, which can be included in an MCHP lookup table produced by a 1D transient AMR model. To estimate the performance of networks with different number of MCHPs, a set of single MCHPs coupled through temperature boundary conditions are modelled and network formulas are applied for the reference case of Gd packed beds. A performance optimum is found for specific design points compliant with building heating applications.