ABSTRACT  The magnetocaloric effect (MCE) is a thermodynamic process in which the temperature changes of a paramagnetic material are the effect of an external magnetic field changing in cycles. The refrigeration occurs in two stages: the first one is the isothermal magnetizing of the material, during which the intensity of the magnetic field rises from $H_0$ to $H_3$ (Fig. 1 process 1-2); during the magnetizing the dipoles of the paramagnetic material become arranged parallely to the intensity of the external magnetic field and the entropy of the material decreases from $S_1$ to $S_2$. As a result of magnetizing, heat is transferred to the surroundings in a quantity proportional to the work executed by the magnetic field. The second stage is the adiabatic demagnetization of the paramagnetic material to the value of the field intensity of $H_0$, during which there occurs a decrease in temperature of the material from $T_p$ to $T_{12}$ (Fig. 2 process 2-3).

Keywords: magnetic refrigeration, magnetocaloric material, adiabatic demagnetization, permanent magnets, 2D and 3D field analysis