Thermodynamics of a model solid with magnetoelastic coupling

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In the paper a computational study of a model solid with magnetoelastic coupling is presented. A system is based on s.c. crystalline lattice with nearest-neighbour ferromagnetic interactions, the long-range Morse interatomic potential and the Debye model. Exploiting the self-consistent, Gibbs energy-based formalism [1], the entropy, specific heat and magnetic susceptibility as well as lattice response functions are calculated. The influence of external pressure and magnetic field on the mentioned quantities is studied, with special emphasis put on the magnetoelastic coupling consequences. In addition the magnetocaloric effect is investigated by discussing isothermal entropy change and adiabatic temperature change in the presence of external pressure.

References:
[1] T. Balcerzak, K. Szałowski, M. Jaščur, J. Magn. Magn. Mater. **426**, 310-319 (2017)