Magnetostriction of $Tb_2(MoO_4)_3$ and MnF_2 in high magnetic field

V. Nizhankovskii

International Laboratory of High Magnetic Fields and Low Temperatures, 53-421 Gajowicka 95, Wroclaw, Poland

Magnetostriction $\Delta L/L$ and magnetization $\mathbf{M}$ along the principal axes of monocrystalline samples of the paramagnetic $Tb_2(MoO_4)_3$ and antiferromagnetic MnF_2 were measured in wide temperature range in magnetic fields $\mathbf{H}$ up to 14 T. Observed in the experiment anisotropy of the magnetostrictive deformation is absolutely different from that produced by a hydrostatic pressure.
Thermodynamic description of the magnetostriction based on the fact that magnetic field does not perform any work is proposed. Obtained equation $\Delta E = \mathbf{MH} + T\Delta S$, where ΔE is the change of the lattice energy due to the magnetostriction and ΔS is the change of the entropy, well describes the experimental results with a reasonable value of the Born term in the inter-ion interaction.
V.I. Nizhankovskii, Eur. Phys. J. **B 71**, 55 (2009)
V.I. Nizhankovskii, Eur. Phys. J. **B 78**, 449 (2010)