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Simulations of magnetic and magnetoelastic properties of Tb₂Ti₂O₇ in paramagnetic phase

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Abstract

Magnetic and magnetoelastic properties of terbium titanate pyrochlore in paramagnetic phase are simulated. The magnetic field and temperature dependences of magnetization and forced magnetostriction in Tb₂Ti₂O₇ single crystals and polycrystalline samples are calculated in the framework of exchange charge model of crystal field theory and a mean field approximation. The set of electron-deformation coupling constants has been determined. Variations of elastic constants with temperature and applied magnetic field are discussed. Additional strong softening of the crystal lattice at liquid helium temperatures in the magnetic field directed along the rhombic symmetry axis is predicted.

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