Transferred hyperfine interaction between the rare-earth ions and the fluorine nuclei in rare-earth trifluorides

The isotropic and anisotropic transferred hyperfine interactions between F ions in the two chemically inequivalent sites and the rare-earth ions (R) have been derived from 19F NMR measurements in the temperature region 100-300 K on single crystals of TbF3 and DyF3. The isotropic interactions are found to be negative and constant in this temperature region and with the numerical values decreasing slightly from TbF3 to DyF3. The anisotropic interactions, when the point dipole contributions are subtracted, are found to be substantially smaller and about equal for the two materials. The crystals contain two symmetry related magnetic sublattices A and B, contributing to the macroscopic susceptibility. The sublattice susceptibility has an off-diagonal component \( \gamma_{ac}^A \) and \( \gamma_{ac}^B = -\gamma_{ac}^A \) in the crystalline axes system. The orientations of the principal axes of the two sublattice susceptibilities are found to vary only slightly with temperature. They are further assigned to definite R's in the unit cell, which cannot be done from macroscopic magnetic measurements.

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