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The Concept of Low-Symmetric Shift Appearing in Polarization Dependence of ESR Spectrum for One-Dimensional Compound

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The Kubo-Tomita theory appearing at 1954 [1] has stood on the assumption of high symmetry of the magnetic perturbation. Thus, ESR spectra are determined only by the angle θ between the static field and the crystal axis. At 1979, this theory is extended [2] so as to discuss systems with low-symmetric perturbation, such as one-dimensional magnetic compounds. The extended formula, which includes a new term arising from the one-dimensionality of spin arrangement, is developed for the second cumulant of the correlation function of the magnetization. This gives the dependence of ESR spectra on polarization. In brief, the term causes a new dynamic shift of resonance field which is essentially influenced by the angle φ between directions of the chain of the compound and the vibrational field. Observed features in TMMC coincide well with our theoretical prediction. Another twenty years elapsed before this dynamic shift had been reexamined at 1999 on the basis of beautiful numerical study by Miyashita et al [3]. In addition, at 2002 Oshikawa and Affleck have discussed this problem of polarization dependence in the scenario of the comparison between their excellent field theory and Kubo-Tomita theory.

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