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Investigation of the spin soliton resonance in the chiral molecule magnet $[Cr(CN)_6][Mn(R)\text{-}pnH(H_2O)](H_2O)]$

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Competition of exchange interactions and antisymmetric exchange (Dzyaloshinskii-Moriya) interactions often gives rise to a helimagnetic spin ordering. Among them, the latter interaction lifts the chiral degeneracy of the right- and left-handed helical rotation. It originates from the lack of an inversion center in the crystal structure. The relationship between the magnetic chirality and the crystal structure draws a special interest in the research of the chiral magnets. Recently, a new type of the ESR mode for the chiral magnet has theoretically been proposed on the basis of the chiral soliton lattice formation Ref. [1, 2]. According to the model, multiple sequential resonance lines with a constant interval, $\delta H \propto 1/H^{0.5}$, are expected to be observed, since the gap is proportional to the spin helix step. A chiral molecule-based magnet in the title has been synthesized successfully by Inoue it et al. Ref. [3]. The magnet is composed of the magnetic ions; Cr^{3+} and Mn^{2+}, and the well controlled chiral molecule 1.2-diaminopropane, (R)-pn. The ferrimagnetically coupled spins of Cr^{3+} and Mn^{2+} order below $T_C = 38$ K. Neutron diffraction measurements suggest that the helical spin arrangement propagates along the a axis with an angle smaller than 20 degree Ref. [4]. We have measured ESR of this magnet to investigate the proposed spin soliton resonance model. Sequential multiple resonance modes have been observed in X-band measurements. The chiral soliton resonance model explains some properties of the observed mode. We will discuss our experimental data comparing with the theoretical model.

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