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topological chiral spin-wave modes in dipolar ferromagnetic thin films RYUICHI SHINDOU, RYO MATSUMOTO, Physics Department, Tokyo Institute of Technology, JUN-ICHIRO OHE, Physics Department, Toho University, SHUICHI MURAKAMI, Physics Department, Tokyo Institute of Technology — Magnetic dipole-dipole interaction in ferromagnet plays role of locking a relative angle between the spin space and the orbital space, just in the same way as the relativistic spin-orbit interaction does in ferromagnetic metals, leading to their quantum anomalous Hall effect. Focusing on this similarity, we theoretically design a couple of periodically-structured ferromagnetic thin film models which support unidirectional (chiral) propagations of spin-waves along its sample boundaries in their dipolar regime. Contrary to the Daemon-Eshbach surface mode, the chiral direction and the number of such spin-wave edge modes are determined by so-called topological Chern integer associated with 'Bloch wavefunctions' for the volume-type spin wave modes. Namely, even if the direction of the magnetic field is fixed, the chiral direction can be still either left-handed or right-handed, depending on the periodic structuring and the frequency range, which is not the case with the Daemon-Eshbach mode. By introducing proper 'atomic orbitals' for the proposed thin film models, we present a simple tight-binding description for the proposed topological chiral edge modes.

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