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Magnetization process of chiral magnet: creation and annihilation of skyrmions and anti-skyrmions WATARU KOSHIBAE, RIKEN CEMS, Wako 351-0198, Japan, NAOTO NAGAOSA, RIKEN CEMS, Wako 351-0198, Japan, Dept. of Appl. Phys., Univ. of Tokyo — By applying a magnetic field to the single-q helical state in the chiral magnet, the skyrmions appear. The topology of the skyrmion is characterized by the skyrmion number N_{sk} defined as $N_{sk} = \int \frac{d^2r}{4\pi} \vec{n}_{\vec{r}} \cdot [(\partial \vec{n}_{\vec{r}}/\partial x) \times (\partial \vec{n}_{\vec{r}}/\partial y)]$, where $\vec{n}_{\vec{r}}$ is the unit vector along magnetic moment at $\vec{r}$, assuming the two-dimensional configuration. The single-q helical state is a topologically trivial magnetic texture, i.e., $N_{sk} = 0$. Therefore, within the continuous deformation, there is no way to realize the skyrmions from the single-q helical state. We find, by a numerical simulation of Landau-Lifshitz-Gilbert equation, the pair nucleation of skyrmion and anti-skyrmion occurs, and they annihilate to reach the skyrmion crystal-like state or the ferromagnetic state. We show the lives of skyrmion and anti-skyrmion in the dynamics of a quenched chiral magnet.

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