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Dynamics of monopole-like excitation in chiral magnets under a current drive[1] SHI-ZENG LIN, AVADH SAXENA, Theoretical Division, Los Alamos National Laboratory — Skyrmions in chiral magnets are hedgehog-like spin textures, which wrap the sphere once. Skyrmion lines in metallic chiral magnets produce an emergent magnetic field that couples to the orbital motion of the conduction electrons. The inflow and outflow of this field around a closed surface is not necessary equal, i.e. the divergence of this field is not necessary zero, and thus it allows for the existence of emergent monopoles. One example is a finite segment of a skyrmion line inside crystal. The two ends of the segment produce a monopole and antimonopole, which are connected by lines of the emergent magnetic flux. Here we study the monopole dynamics induced by an electric current injected in the chiral magnet. We reveal that skyrmion segments are nucleated via the creation of monopoles and antimonopoles. Then these segments merge to form longer skyrmion lines via annihilation of monopoles and antimonopoles. Finally these skyrmion lines span the whole system, where all monopoles and antimonopoles disappear. The skyrmion lines are destroyed via the proliferation of monopoles and antimonopoles. We also propose to create the monopoles in a controlled way by applying current to surfaces. The existence of monopoles can be inferred from transport or imaging measurements.

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