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Dynamic decay of single vortex into vortex-antivortex tuples SHIKHA JAIN, VALENTYN NOVOSAD, Materials Science Division, Argonne National Laboratory — A variety of metastable states, including vortices, antivortices, and their combinations is typical for magnetically-soft thin films and patterned structures. Physics of individual spin vortices in patterned structures has been rather extensively explored. In contrast, there are only few studies of vortex – antivortex – vortex (v-av-v) system, in a part because v-av-v is rather difficult to obtain in experimental samples. In this work we will demonstrate how a recently proposed resonant-spin-ordering technique can be used to induce the dynamic decay of a single vortex into vortex-antivortex states in elongated elements. The approach is based on driving the system from the linear regime of constant vortex gyrations to the non-linear regime of vortex-core reversals at a fixed excitation frequency. Subsequently reducing the excitation field to the linear regime stabilizes the system into v-av-v state that is completely decoupled from the initialization excitation frequency. Newly acquired v-av-v state is a stable state in remanence, is characterized by a number of collective excitation modes, depending on the combination of the vortex core polarities, and/or the excitation field direction.

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