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Resonant-spin-ordering: a new approach to dynamic control of excitation bands in interacting mesomagnets VALENTYN NOVOSAD, SHIKHA JAIN, FRANK FRADIN, JOHN PEARSON, Materials Science Division, Argonne National Laboratory, VASIL TIBERKEVICH, ANDREI SLAVIN, Department of Physics, Oakland University, SAMUEL BADER, Materials Science Division and Center for Nanoscale Materials, Argonne National Laboratory — Two interacting vortices were used as a model system to demonstrate the resonant-spin-ordering technique for effectively controlling its magnetic states and excitation bands. This is achieved by 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 of one of the coupled modes. Subsequently reducing the excitation field to the linear regime, stabilizes the system to a polarity combination whose resonant frequency is decoupled from the initialization frequency. The transition of the state from one polarity combination to the other is clearly evident from the contrast in the microwave absorption amplitude obtained by gradually increasing the rf-field to higher magnitudes at the resonant frequency of one of the modes and subsequently decreasing it. Hysteresis is observed in the forward and backward trace of the rf-field sweep which gives a clear signature of the mode transition. Finally, a phase diagram is built to identify the conditions necessary to choose a particular ground state configuration with respect to the amplitude and the frequency of the in-plane oscillating field.

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