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Dynamics of a Many-Spin System including Relaxation Effects SOYOUNG JUNG, MANUEL BERRONDO, Brigham Young University — The Heisenberg model constitutes an essential stepping stone to understand ferromagnetism and anti-ferromagnetism in magnetic materials. The basic idea is that individual two-spin short-range interactions of atomic magnetic dipoles can give rise to coherent long-range behavior in a lattice structure. These "classical spins" are free to rotate and can arrange themselves in a parallel or anti parallel configuration in the ordered state. The local magnetic field acting on the spin arises as the result of the addition of nearest neighbors (NN) spins. In our present project we study the **dynamics** of N3-d spins in a two-dimensional square lattice with a NN constant exchange interaction. An additional dissipative Gilbert term is included to allow for the relaxation to the (anti-)ferromagnetic global state. We have developed a Matlab code that preserves the individual spin magnitudes at each time step in the dynamics using a symplectic integration second-order method. We present our results in terms of plots and animations of the spin-behavior on the lattice. In addition we have allowed for a time dependence of the Gilbert term considered as a driving force. The spin domain formation appears as a metastable state in the ferromagnetic case and we are able to follow the corresponding dynamics.

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