This program is used to do the simulation of multi-spin interactions under external magnetic field. The spin Hamiltonian can be described by

$$H = H_{exc} + H_{app} + H_{ani}.$$

H_{exc} is the spin-spin interaction, that spin would prefer to lie parallel or anti-parallel.

$$H_{\mathrm{exc}} = -\sum_{i \neq j} J_{ij} S_i S_j \,,$$

Where J is the exchange paramaters.

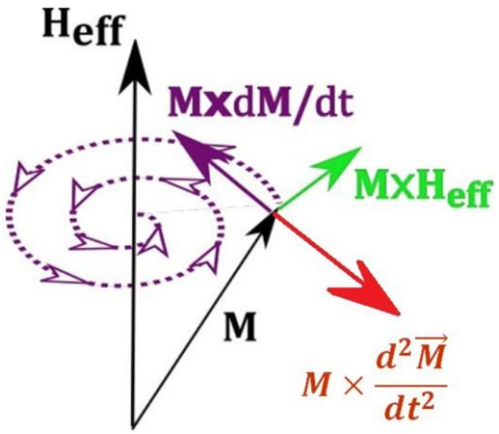
H_{app} is the spin and applied mangnetic effective field $\mathbf{H_{app}}$ interaction,

$$H_{app} = -\sum_{i} \mu_s S_i \mathbf{H_{app}} \,.$$

H_{ani} is the uniaxial anisotropy caused by the shape of the materials,

$$H_{ani} = -k_u (S_i \cdot z)^2.$$

The spin dynamic is described by the LLG equation,



$$\frac{dM}{dt} = -\gamma M \times H_{eff} + \alpha M \times \frac{dM}{dt}$$

Where $\mathbf{H_{eff}} = -\frac{1}{\mu_s}\frac{\partial H}{\partial S}$.

We then use RK4 algorithms to do the simulation of time evolution.

To run the program, edit your simulation paramters

gcc main.c -o main –lm

./main