Simulating magnons and spin chains

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Contents

1 Introduction & Background

Hamiltonian

$$H = -\frac{1}{2}\sum_{j,k}^{N} J_{jk}\mathbf{S}_j \cdot \mathbf{S}_k - d_z \sum_{j=1}^{N}(S_{j,z})^2 - \mu \sum_{j=1}^{N}\mathbf{B}_j \cdot \mathbf{S}_j \tag{1}$$

Landau-Lifshitz-Gilbert equation

$$\frac{\partial \mathbf{S}_j}{\partial t} = \frac{-\gamma}{\mu(1+\alpha^2)}\left[\mathbf{S}_j \times \mathbf{H}_j + \alpha \mathbf{S}_j \times (\mathbf{S}_j + \mathbf{H}_j)\right] \tag{2}$$

$$\mathbf{H}_j = -\frac{\partial H}{\partial \mathbf{S}_j} + \boldsymbol{\xi}_j \tag{3}$$

References