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Dynamic magnetization of single domain nanomagnet

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The dynamic magnetization of nanomagnets is significant to spintronic devices in terms of high speed and high-density storage technology or logic applications. The dynamics of the macrospin model of a single-domain nanomagnet is investigated in both analytical and numerical methods based on the Landau-Lifshitz-Gilbert equation which is a nonlinear differential equation describing the evolution of magnetization vector. The dynamic hysteresis, namely the magnetic switching under high frequency magnetic field with/without spin transfer torque is analyzed in terms of the evolution of the geometry of loop. The shape of static hysteresis loop is determined by the parameter of damping, meanwhile the shape evolution of dynamic hysteresis loop is dependent on the magnitude of field and frequency. Frequency dependent response with resonant peak has been found in the dispersion curve. The phase diagram is obtained to be able to have a clear picture of the dynamic magnetization of nanomagnets driven by periodic field or current.

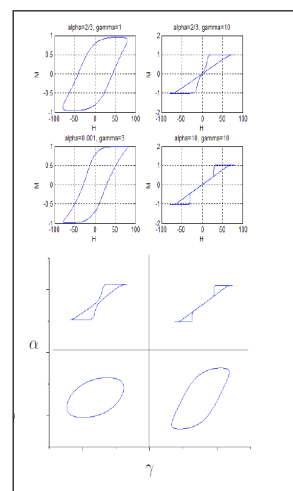


Figure-1: Phase transition of hysteresis due to γ and α .

Recent Publications

1. Yongping Liu, Dongchang Wu, Fenfen Wei, Tao Kong, Hao Yu, Jinping Zhang and Guosheng Cheng (2012) Potassium element modulation of optical and electrical properties of the quasi-one-dimensional $\text{KxBi}_{1-x}\text{FeO}_{3-y}$ system. *CrystEngComm*; 14: 7189-7194.
2. X W Dong, Y J Wu, J G Wan, T Wei, Z H Zhang, S Chen, H Yu and J M Liu (2008) Phase shift of electric-field-induced magnetization in magnetoelectric laminate composite. *Journal of Physics D: Applied Physics*; 41(3): 035003.

Biography

Hao Yu is an Associate Professor at Xi'an Jiaotong-Liverpool University. He has received his PhD degree in Condensed Matter Physics from Nanjing University in 2007. He had worked for Suzhou Institute of Nano-Tech and Nano-Bionics of Chinese Academy of Sciences from 2007 to 2009. He had joined Xi'an Jiaotong-Liverpool University in February 2010. His research interests include spintronics and complex network.

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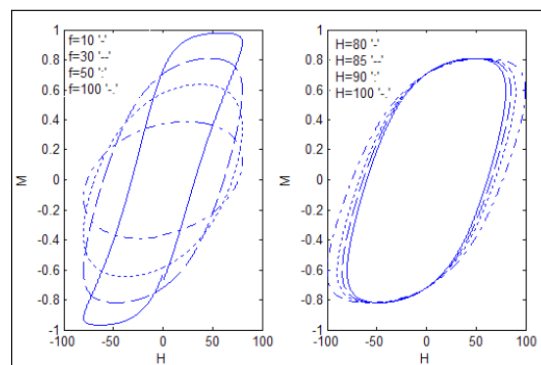


Figure-2: Hysteresis evolution in terms of frequency (f) and field (H).