ZHU, Zhifeng
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Education

National University of Singapore (NUS), Singapore — 08/2014 - Now
- **Ph.D. Candidate** in Electrical and Computer Engineering

University of Electronic Science and Technology of China (UESTC), Chengdu, China — 09/2010 - 07/2014
B.Sc. in Microelectronics Technology

Employment

National University of Singapore (NUS), Singapore — 10/2017 - Now
- **Research Engineer** in Electrical and Computer Engineering

Research Areas

My Ph.D. study focus on the theoretical and numerical study of novel spintronic devices, including the MRAM and spin torque nano-oscillator. I have solid understanding on the theory of magnetism, I am proficient in both macrospin and micromagnetic modelling, and I am familiar with experimental fabrication and characterizations. My current research focus on the study of spintronic devices based on antiferromagnets and ferrimagnets. I have in-depth collaboration with both experimental and theoretical groups, which improves my understanding on spintronics.

Research Projects

- **Theoretical and numerical study of the current-driven domain wall motion in ferrimagnets** 2018-2019
  Based on the atomistic model, we have numerically studied the domain-wall motion in ferrimagnets. We have also collaborated with experimental groups on this project. This work could advance the development of ferrimagnet-based racktrack memory. Related publications: [1, 2]
- **Theoretical and numerical study of the temperature properties, magnetic moment and angular momentum compositions, and current-driven magnetization dynamics** 2017-2018
  Based on the Landau-Lifshitz-Bloch model, we have studied the current-driven magnetization dynamics in ferrimagnets. Related publications: [8, 9]
- **Switching-based spintronic oscillator** 2015-2016
  We have proposed a switching-based spintronic oscillator which is evaluated using the macrospin simulation. Related publications: [11]
- **Voltage-input spintronic oscillator based on the competing torque effect** 2014-2015
  We have proposed a voltage-input spintronic oscillator which is evaluated using both macrospin and micromagnetic simulations. Related publications: [4]

Featured Skills

Programming: Matlab, C/C++, Golang, Shell script, Python, CUDA, VHDL, Verilog
Softwares: Matlab, OOMMF, mumax3, COMSOL Multiphysics, ANSYS Maxwell
Language: Chinese (native), English (fluent)

Professional Activities and Services

Reviewer: Journal of Applied Physics

Publications

1. Kaiming Cai, **Zhifeng Zhu**, Jong Min Lee, Rahul Mishra, Lizhu Ren, Pan He, Guang Yang, Gengchiau Liang, Kie Long Teo and Hyunsoo Yang, Dynamics of ultrafast spin-orbit torque induced magnetization switching in compensated ferrimagnets with sub-nanosecond current pulses, (under review in Nat. Elec., positive comments, main author completing the theoretical and numerical results)
2. **Zhifeng Zhu**, Kaiming Cai, Jiefang Deng, Venkata Pavan Kumar Miriyala, Hyunsoo Yang, Xuanyao Fong, Gengchiau Liang, Electrical generation and detection of terahertz signal based on spin-wave emission from ferrimagnets, (in submission)
3. Shuyuan Shi, Shiheng Liang, **Zhifeng Zhu**, Kaiming Cai, Shawn D. Pollard, Yi Wang, Junyong Wang, Qisheng Wang, Pan He, Jiawei Yu, Goki Eda, Gengchiau Liang, and Hyunsoo Yang, Efficient magnetization switching and Dzyaloshinskii-Moriya interaction in WTe2/ferromagnet heterostructures, (accepted by Nat. Nanotechnol., main author completing the theoretical and numerical results)

4. **Zhifeng Zhu**, Jiefang Deng, Xuanyao Fong, and Gengchiau Liang, Voltage-input spintronic oscillator based on competing effects for large output power, (J. Appl. Phys. **125**, 183902 (2019))
5. Venkata Pavan Kumar Miriyala, **Zhifeng Zhu**, Gengchiau Liang, Xuanyao Fong, Spin-wave mediated interactions for Majority Computation using Skyrmions and Spin-torque Nano-oscillators, (J. Magn. Magn. Mater. **486**, 165271 (2019))
6. **Zhifeng Zhu**, Xuanyao Fong, and Gengchiau Liang, Temperature aware study of spin torque switching in ferrimagnetic alloy, 2nd SG-SPIN/Tohuku Workshop on Spintronics (Singapore, Feb.22, 2019)
7. Kaiming Cai, Rahul Mishra, Lizhu Ren, **Zhifeng Zhu**, Gengchiau Liang, Kie Teo, Hyunsoo Yang, Ultrafast domain wall propagation in ferrimagnets by spin-orbit torques, Joint MMM-Intermag Conference, (Washington, DC, 2019)
8. **Zhifeng Zhu**, Xuanyao Fong, and Gengchiau Liang
   "Spin-torque-induced magnetization dynamics in ferrimagnets based on Landau-Lifshitz-Bloch Equation" [J. Appl. Phys. **124**, 193901 (2018)] (Feature Article)
9. **Zhifeng Zhu**, Xuanyao Fong, and Gengchiau Liang
   "Theoretical Proposal for Determining Angular Momentum Compensation in Ferrimagnets", Phys. Rev. B **97**, 184410, (2018)
10. **Zhifeng Zhu**, Xuanyao Fong, Gengchiau Liang, Modeling of Spin Torque Switching in Ferrimagnetic Material Using Landau-Lifshitz-Bloch Equation, Magnetics Symposium, (Singapore, Oct.05,2017)
11. Gaurav Gupta, **Zhifeng Zhu**, Gengchiau Liang, Switching based Spin Transfer Torque Oscillator with zero-bias field and large tuning-ratio, arXiv:1611.05169, (2017)
12. **Zhifeng Zhu***, Gaurav Gupta*, Hsin Lin and Gengchiau Liang (*equal contribution)
    "Wrangling Spin-Orbit-Torque Voltage-Controlled-Oscillator"
    International Conference on Solid State Devices and Materials (SSDM), (Tsukuba, Japan, Sept.27, 2016)

Teaching

Teaching Assistant of NUS EE1003 (Introduction to Signals & Communication), EE2031 (Circuit and Systems Design Lab), EE5431R (Fundamentals of Nanoelectronics), EE5433R (Functional Devices)

Award

- 2014-2017 NUS Research Scholarship
- 2013 Second-class award in "Challenge Cup" Electronic Design Competition, Sichuan Province
- 2012, 2013 Second-class award of People's Scholarship, UESTC