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C. S. Nikhil Kumar

Magnetic Resonators

Feedback with Magnetic Field and Magnetic Cavity

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To my parents, my wife Naina, my supervisors Prof. Anil Prabhakar and Prof. Ashwin A. Tulapurkar.

Contents

Abbreviations

2D MC	Two-dimensional magnonic crystal
ABL	Absorbing boundary layer
AMCW	Antidot magnonic crystal waveguide
CPW	Coplanar waveguide
DE	Damon–Eshbach
DMI	Dzyaloshinskii–Moriya interaction
GPU	Graphical processing unit
ID MC	One-dimensional magnonic crystal
LLGS	Landau–Lifshitz–Gilbert–Slonczewski
MCC	Magnonic crystal cavity
MCs	Magnonic crystals
MCW	Magnonic crystal waveguide
MSs	Micromagnetic simulations
NC STNO	Nanocontact STNO
PBC	Periodic boundary condition
RF	Radio frequency
STNOs	Spin-torque nano-oscillators
STT	Spin-transfer torque
SVVASER	Spin wave amplification by the stimulated emission of radiation
SWs	Spin waves

Notations

γ	Gyromagnetic ratio (rad/s/T)
M_s	Saturation magnetization (A/m)
λ_{ex}	Exchange constant (pJ/m)
α	Damping factor
f	Frequency (Hz)

k	Wave vector (rad/nm)
ζ	Spin polarization efficiency
$\mu_{\mathbf{B}}$	Bohr magnetron (J/T)
ρ,R	Radius of nanocontact (nm)
a	Lattice constant (nm)
A	Exchange stiffness constant (J/m)
λ_{ex}	Exchange length (nm)
δ	Thickness (nm)
Ω	Reduced frequency
V_p	Phase velocity (m/s)
L_3	Three-hole defect
Q	Quality factor
ff	Filling fraction
H	Field (Oe)
$I_{\mathbf{DC}}$	DC current (A)
$I_{\mathbf{AC}}$	AC current (A)
T	Temperature (K)
ω	Angular frequency (rad/s)