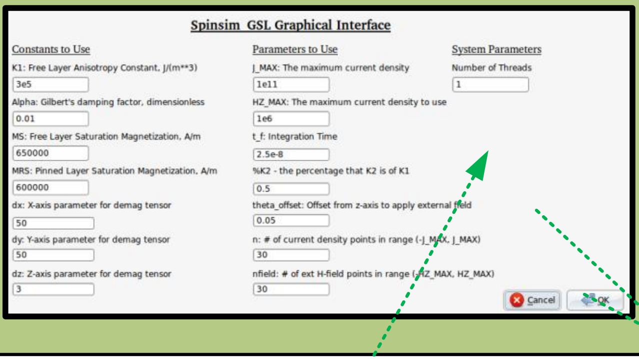
qt_ui.ui -> qt_ui.py

“Compiled” PyQt-based UI Form

Implements functions for calling handlers in Spinsim_gui.py



Spinsim GSL Graphical Interface

Constants to Use

K1: Free Layer Anisotropy Constant, J/(m**3): 3e5

Alpha: Gilbert's damping factor, dimensionless: 0.01

MS: Free Layer Saturation Magnetization, A/m: 650000

MRS: Pinned Layer Saturation Magnetization, A/m: 600000

dx: X-axis parameter for demag tensor: 50

dy: Y-axis parameter for demag tensor: 50

dz: Z-axis parameter for demag tensor: 3

Parameters to Use

J_MAX: The maximum current density: 1e11

HZ_MAX: The maximum current density to use: 1e6

t_f: Integration Time: 2.5e-8

%K2 - the percentage that K2 is of K1: 0.5

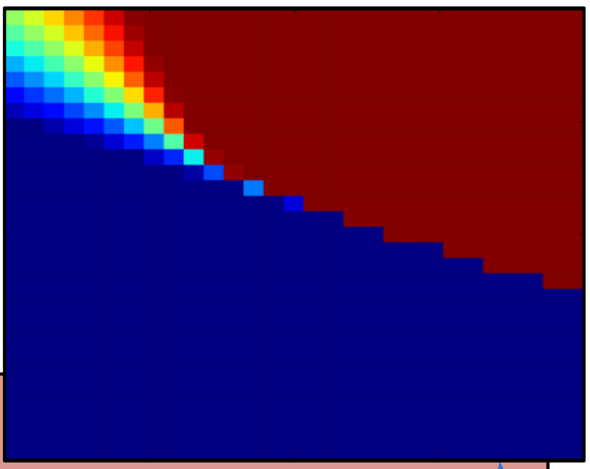
theta_offset: Offset from z-axis to apply external field: 0.05

n: # of current density points in range (-J_MAX, J_MAX): 30

nfield: # of ext H-field points in range (-HZ_MAX, HZ_MAX): 30

System Parameters

Number of Threads: 1



Spinsim_gui.py

Top-level python file

Initializes and starts GUI, loads parameters from GUI

MyForm()
Set up the GUI
Set up timers
Initialize everything

Progress_timer
Calls handleUpdateProgress while simulation is running

handleUpdateProgress()
Update the progress bar based on the latest output from the simulator

Progress Counter

runHsweepFun()
Call Spinsim C engine via shell command
Read back results from stdout
Update progress variable

runHsweepSlot()
Read parameters from GUI
Create a new thread for running the Spinsim C engine

makePlotSlot()
Handler for the plot making function

spinsim_make_plots()
Read the file data that C engine generates
Use pcolor() from mylab/matplotlib to generate graphics

Stdout - Progress Report

Shell command
Pass in all command-line parameters

Spinsim engine output files
magsweepdown_output (2D array)
magsweepup_output (2D array)
magsweep_output_j (1D array)
magweep_output_hzHz (1D array)
(FILES)

llg1.c

llg1()
Differential equation for integrator to solve
Describes structure with 2 layers, 1 free, 1 pinned (3 dimensional solution)

llg1_6.c

llg1_6()
Differential equation for integrator to solve
Describes structure with 3 layers, 2 free, 1 pinned (6 dimensional solution)

Spin_helpers.c

Helper Functions
“Pure” Functions that calculate demagnetization tensors and matrices

Hsweep() passes parameters (called via GSL integrator)
llg1() returns result based on starting y[] and time t
Called repeatedly for integration

Parameters

Demagtensors, matrices, filled linspace

Spinsim.c (top level of C engine)

Main()
Process command line parameters
Call Hsweep()
Write out data

Parameters, empty memory space “magsweepup”, “magsweepdown”, “Hz”, “j”

Hsweep_wrapper()
Wrapper function for Hsweep(), used to implement threading
Unpack parameters

Same as to Hsweep_wrapper(), called if number of threads = 1

Parameters, empty memory space “magsweepup”, “magsweepdown”, “Hz”, “j”

Filled “magsweepup”, “magsweepdown”, “Hz”, “j”

Hsweep()
Set up constants and demagtensors()
Call GSL integrator
Return results