MRI Simulator Notes

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Tasks

- I began writing the simulation code in Python.
- I wrote the basics of the classes Em, Pulse, and Sim.
    - A Em object is the basic particle of simulation. Each Em has a magnetization, position, and velocity.
    - A Pulse object is a set of RF and/or gradient waveforms. A Pulse object can be in one of two modes: "free" (x and y gradients specified) or "excite" (RF and z gradient specified).
    - Sim is the object that runs the main simulation. Sim instantiates a number of Em objects and reads in the pulse sequence as a list of Pulse objects.
- I tested these classes.
    - I set $T_1 = 1$, $T_2 = 1$, $\gamma = 1$.

Free precession of an em with $B_z = 10$
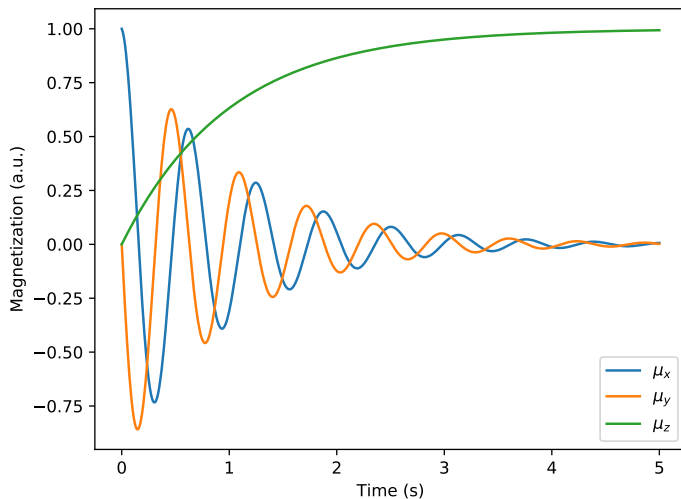
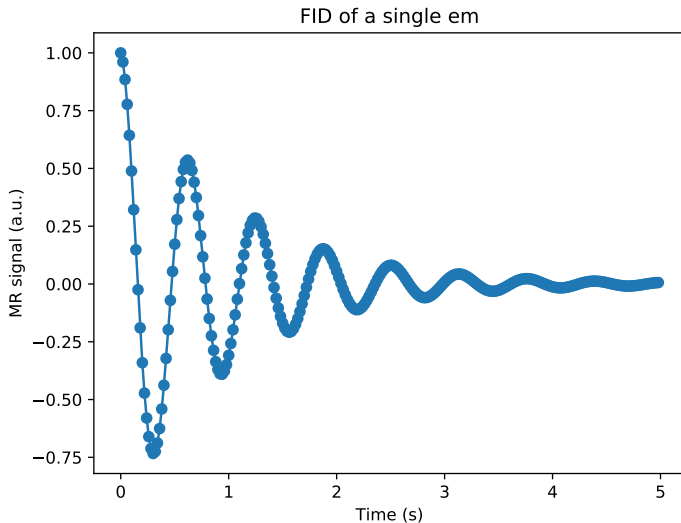# Free precession of an em with $B_z = 20$
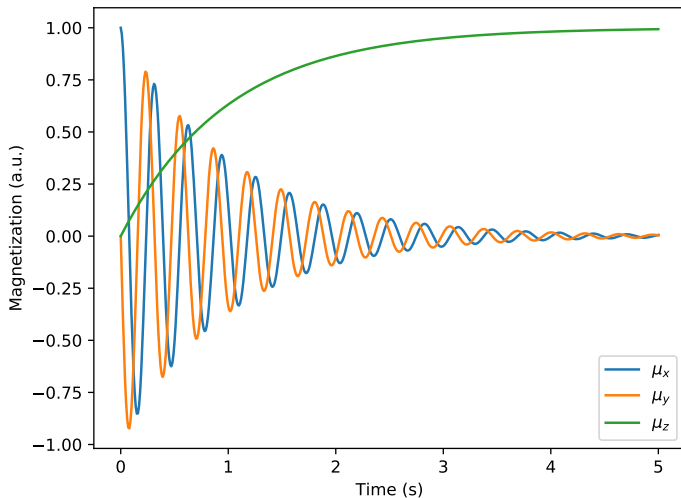
FID of one em

$B_0 = 10$, $G_x = 10$, em is at origin $\Rightarrow$ em experiences $B_z = 10$.

FID of a single em

FID of two ems

$B_0 = 10$, $G_x = 10$, em one is at origin $\Rightarrow$ experiences $B_z = 10$, em two is at $x = 1 \Rightarrow$ experiences $B_z = 20$.