BME 599: Advanced Topics in MRI
HW #2

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1 Problem 1: Extended phase graphs

Shown below is a sequence diagram of a fast spin echo (FSE) with its first 8 refocusing pulses within one repetition time (TR). Each RF pulse is designated as a delta function, so you do not need worry about the slice profile. Refocusing pulses are spaced 5ms apart (echo spacing).

a. Please write a function using EPG to simulate spin echo train echo amplitudes for a sequence with $90^\circ{}_x$ excitation, followed by refocusing pulses of $[\alpha + (90 - \alpha/2)]_y$, α_y, α_y ,... for 64 echoes for $T1 = [200 : 100 : 1500]$ ms, and $T2 = [50 : 30 : 300]$ ms

i. Simulate echo amplitudes with $\alpha = 180^\circ$, and plot amplitudes with five different T1 and T2 combinations

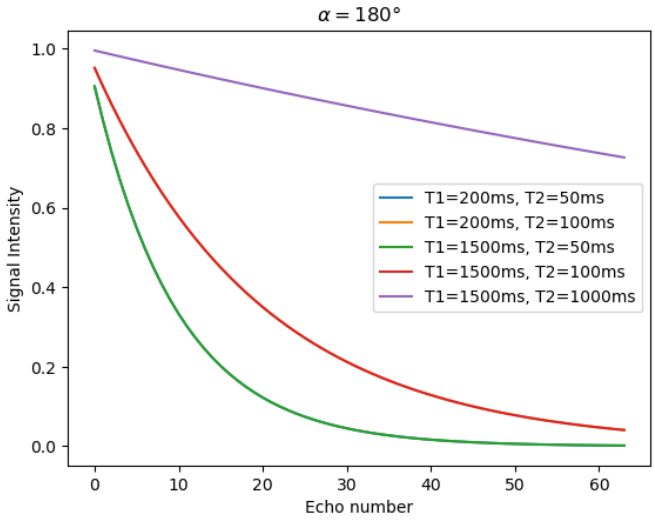

Figure 1: Echo amplitudes with $\alpha = 180^\circ$.

ii. Simulate echo amplitudes with $\alpha = 120^\circ$, and plot amplitudes with five different T1 and T2 combinations

iii. Simulate echo amplitudes with $\alpha = 60^\circ$, and plot amplitudes with five different T1 and T2 combinations

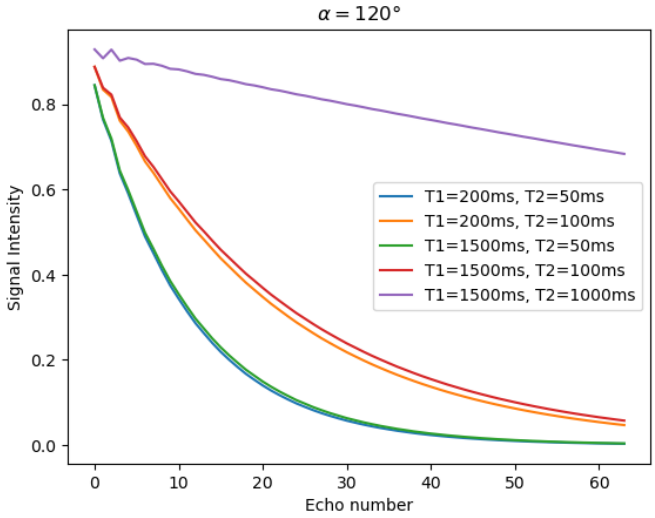

Figure 2: Echo amplitudes with $\alpha = 120°$.

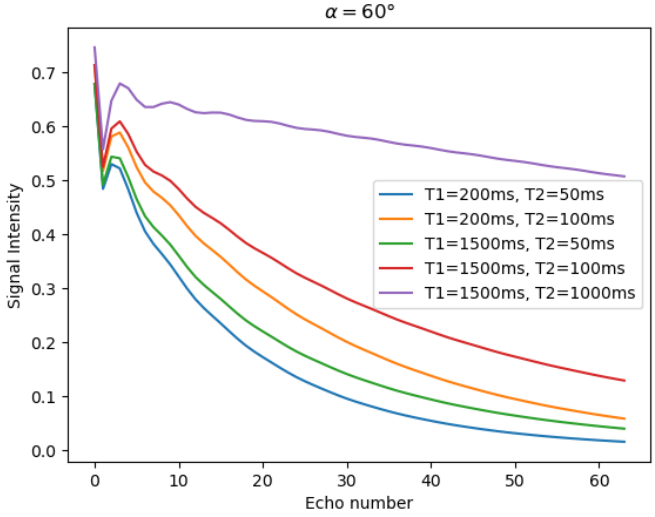

Figure 3: Echo amplitudes with $\alpha = 60°$.