Bioengineering 278: Magnetic Resonance Imaging Laboratory
Winter 2011
Lab 9

1. **Time of Flight MRA.** In this exercise you will collect and analyze 3D TOF images of the carotid arteries. Use 32 partitions (slices), 256x256 matrix, and a slice thickness of 1mm. Use a TR of 30ms and repeat the scan with flip angles of [10 20 30 40 50]. From this data calculate the velocity in one artery using two methods:
   - **a.** Choose a single flip angle where the signal clearly falls off as it enters the slab, and measure the decay of the vessel signal as a function of distance into the slab, and from this decay curve estimate the velocity of flow. The data should follow the TOF signal curves from the lecture: http://cfmriweb.ucsd.edu/ecwong/tof.m, but you will need to chop off the first few slices because the signal is increasing due to slice profile effects rather than decreasing from TOF effects. You can repeat this with other flip angles and you should get about the same answer. (5 pts)
   - **b.** Choose a single point along the artery, and use the dependence of the signal upon flip angle, along with the distance of the point into the slab to calculate the velocity. Does it match with a? (5 pts)
2. **Arterial Spin Labeling**. In this exercise you will collect and analyze an ASL inflow curve. Use the spep pulse sequence and a pseudo-continuous tag with a single echo spiral readout. From the data, calculate maps of CBF and the transit delay δt. Assume perfect tagging efficiency and plug flow (the bolus is delivered without flow related dispersion. (10 pts)

Parameters:
FOV 32 (we want really low res – this is a highly SNR starved experiment)
slthick 10
3 slices, widely spaced, low middle and high in the brain
spin echo
matrix 64
TR 3000
TE min
CVs:
tag = 9 (pseudocontinuous tagging)
dda = 2
reps = 60

pfile	**prepti (start of tag to image)**	**pwpcasl (duration of tag)**
	300ms	250ms
	600ms	550ms
	900ms	850ms
	1200ms	1000ms
	1500ms	1000ms
	1800ms	1000ms
	2100ms	1000ms