

(a) If sequential acquisition is used with $TR = 5\text{ ms}$, calculate the percentage of signal saturation with sequential slice ordering.

In sequential acquisition, the signal saturation is:

$$S = M_0 * (1 - e^{-\frac{N_{phase} * TR}{T_1}})$$

Given that $N_{phase} = 128$, $TR = 5\text{ms}$, $T_1 = 300\text{ms}$, $NEX = 1$, and the RF pulse excites 20% of the longitudinal magnetization:

$$S = 0.8 * (1 - e^{-\frac{128 * 5}{300}}) = 70.52\%$$

(b) If sequential acquisition is used with $TR = 5\text{ ms}$, calculate the percentage of signal saturation with odd/even slice ordering.

For odd/even slice ordering:

$$S = M_0 * (1 - e^{-\frac{N_{phase} * TR}{2T_1}})$$

Given that $N_{phase} = 128$, $TR = 5\text{ms}$, $T_1 = 300\text{ms}$, $NEX = 1$, and the RF pulse excites 20% of the longitudinal magnetization:

$$S = 0.8 * (1 - e^{-\frac{128 * 5}{2 * 300}}) = 52.48\%, \text{ which is equal to odd/even}$$