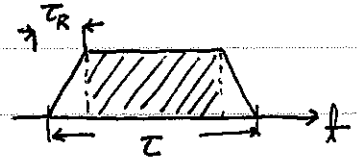


* Readout lobes



ex > $\tau = 1 \text{ ms}$, $\tau_R = 1/4 \text{ ms}$

$$2 k_{x,max} = \frac{\delta}{2\pi} (\tau - 2\tau_R) G_{max}$$

$$= 4.257 \text{ kHz/G} \cdot \frac{1}{2} \text{ ms} \cdot 4 \text{ G/cm}$$

$$= 8.514 \text{ cycles/cm}$$

$$\Delta x = \frac{1}{2 k_{x,max}} = \frac{1}{8.514 \text{ cycles/cm}} \approx 0.12 \text{ cm (TBW=1)}$$

with a TBW = 4 pulse (typical)

$$4 \cdot \Delta x \approx 0.47 \text{ cm}$$

* Blips



$$\Delta k_y = \frac{\delta}{2\pi} \cdot \frac{1}{2} \cdot 2\tau_R G_{max}$$

$$= 4.257 \text{ kHz/G} \cdot \frac{1}{4} \text{ ms} \cdot 4 \text{ G/cm}$$

$$= 4.257 \text{ cycles/cm}$$

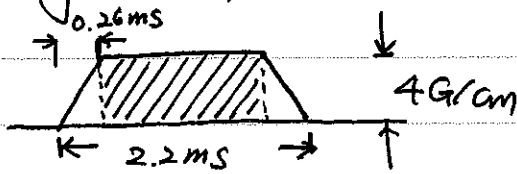
Assume $L = 11$ (k-space lines)

$$2 k_{y,max} = (L-1) \Delta k_y = 42 \text{ cycles/cm}$$

$$\Delta y = \frac{1}{2 k_{y,max}} = 0.024 \text{ cm}$$

$$FOV = \frac{1}{\Delta k_y} = 0.23 \text{ cm}$$

* Design Examples



$$\Delta T = \frac{1}{460 \text{ Hz}} = 2.2 \text{ ms} \quad (\text{@ } 1.5 \text{ T})$$

- spatial selection

$$2kz_{\text{max}} = (2.2 - 2 \cdot 0.26) \cdot 4 \cdot (4.257) = 28.6 \text{ cycles/cm}$$

$$\Delta z = 0.035 \text{ cm}$$

With $TBW = 4$ subpulses, slice thickness is

$$4 \cdot (\Delta z) = 0.14 \text{ cm}$$

⇒ Enough gradient area for very thin slices.

- spectral selection

Assume $TBW = 4$, passband $\sim \pm 125 \text{ Hz}$
(spectral envelope)

$$TBW = 4 = \text{time} \cdot \text{BW} \quad 250 \text{ Hz}$$

$$\Rightarrow \text{time} = 16 \text{ ms}$$