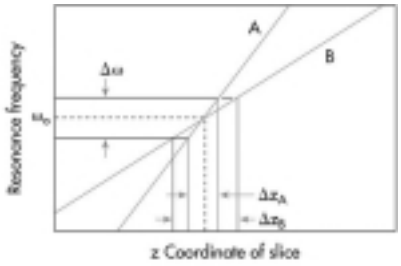
RF Pulse Design

- RF pulses can be fully described by the following properties:

1. RF pulse Amplitude (A)
2. RF pulse envelope (e(t))
3. RF pulse modulation frequency (ω_1)
4. RF pulse duration (T)
5. Slice selection gradient (G_z)



- The design criteria for an RF pulse may include one or all of the following:

1. Flip angle (α)
2. Slice location (z_o) (=0 for magnet isocenter)
3. Slice thickness (Δz)
4. Slice profile (p(z))

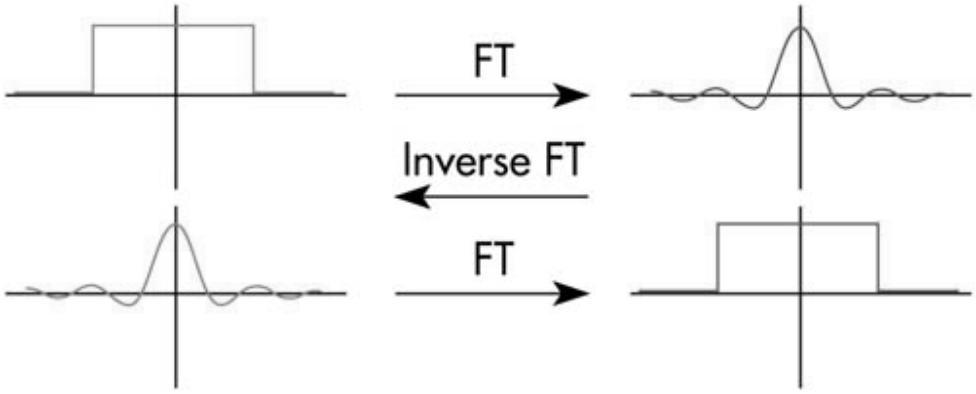
- Governing equations (for low flip angle rectangular RF pulses for simplicity):

$$\alpha = \gamma \cdot \int_{pulse} e(\tau) d\tau = \gamma \cdot A \cdot T \quad (1)$$

$$\Delta z = \frac{1}{\gamma \cdot G_z \cdot T} \quad (2)$$

$$z_o = \frac{(\omega_1 - \gamma \cdot B_0)}{\gamma \cdot G_z} \quad (3)$$

$$p(z) \overset{\mathfrak{I}}{\longleftrightarrow} e(t) \quad (4)$$



RF Pulse Slice Profile