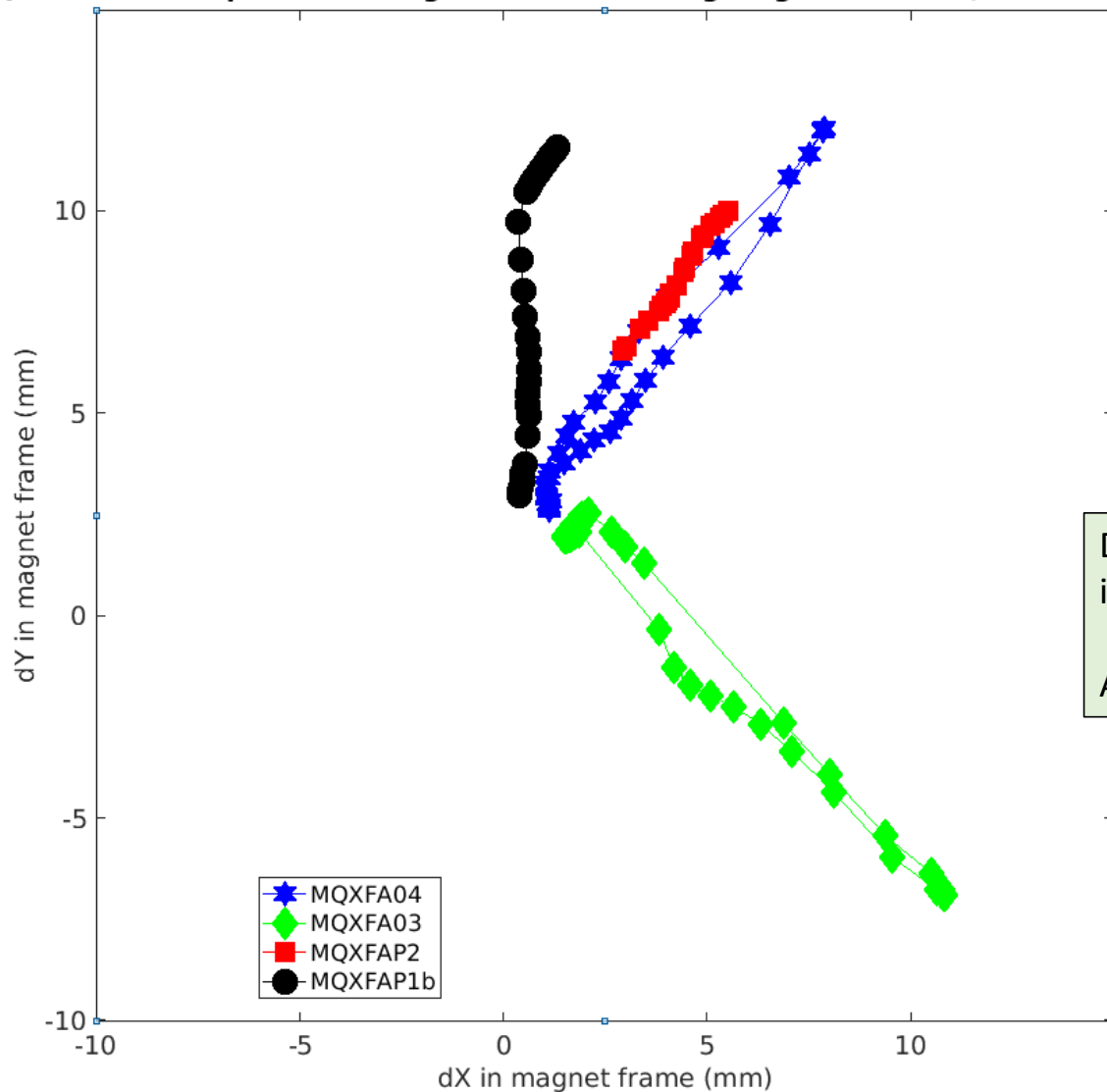


MQXF Position of probe wrt magnet with increasing magnet current (at Z= magnetCen)



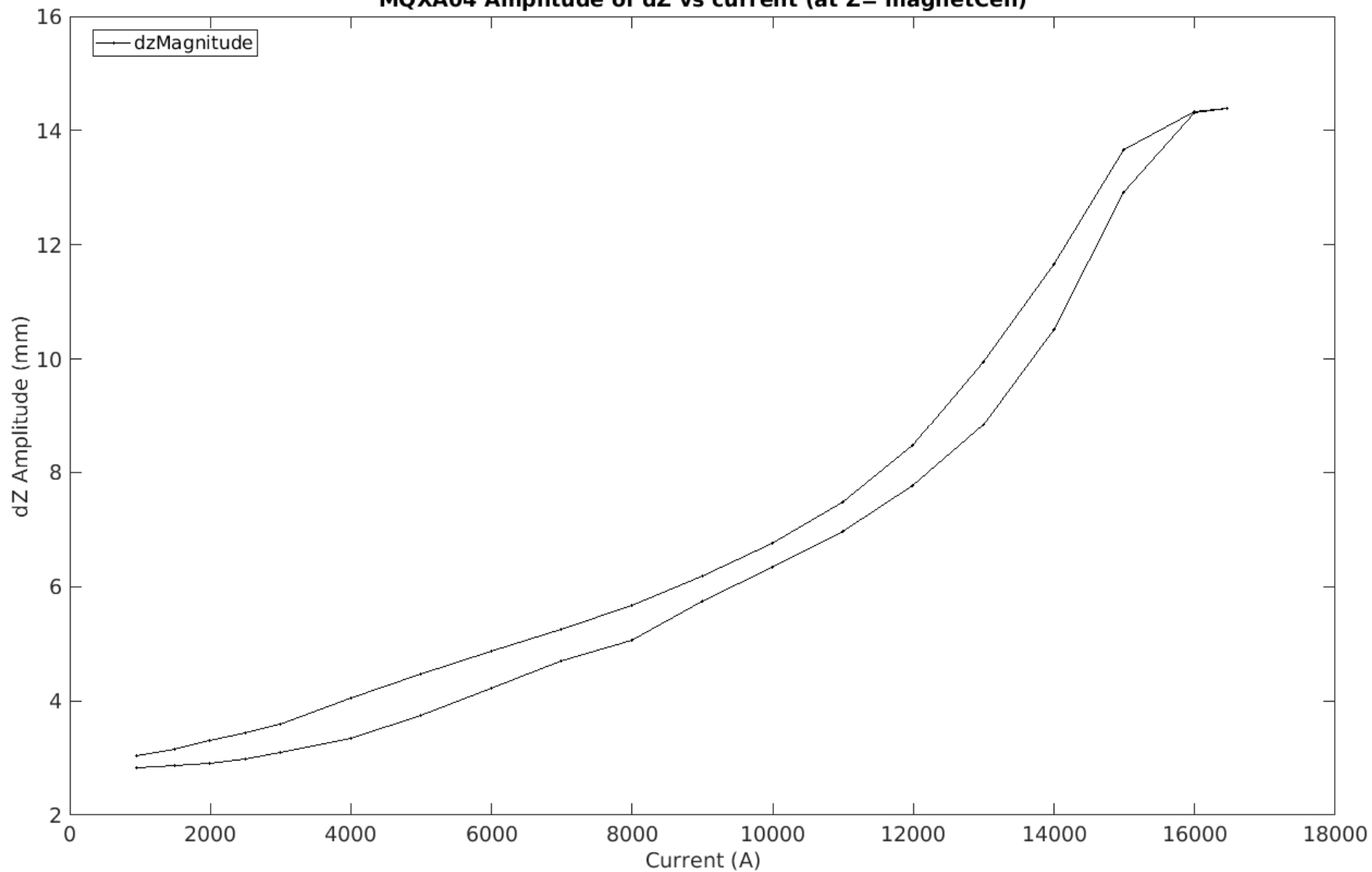
Direction of bowing for MQXFA04 is into Quadrant 1 (coil 203)

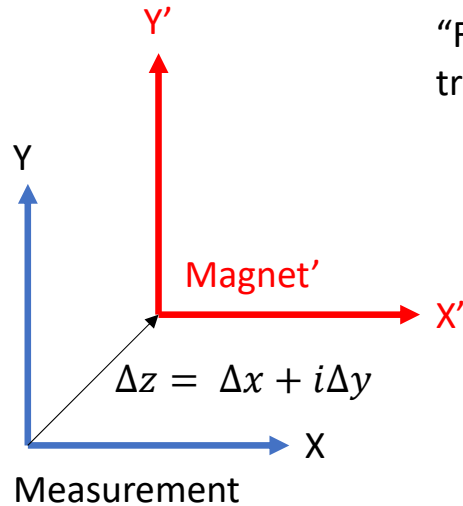
Quenches near center were in Q2 (coil 113)

Direction of bowing for MQXFA03 is into Q4 (coil 111)

All but the first quench were in coil 111

MQXA04 Amplitude of dZ vs current (at Z= magnetCen)





“Feed-down” harmonics from measurement frame translation offset wrt magnet frame

$$B'_n + iA'_n = \sum_{k=n}^{\infty} (B_n + iA_n) \frac{k!}{n!(k-n)!} \left(\frac{\Delta x + i\Delta y}{R_{ref}} \right)^{k-n}$$

For measured dipole (un-allowed harmonic) in quadrupole field, To first order have:

$$B'_1 + iA'_1 = (B_1 + iA_1) + \frac{\Delta x + i\Delta y}{R_{ref}} (B_2 + iA_2)$$

Δz is the offset that the measurement system must move to be in the magnet frame

$$\Delta x + i\Delta y = -1 * \frac{(B_1 + iA_1)}{(B_2 + iA_2)} * R_{ref}$$

Since $B'_1 + iA'_1 \equiv 0$,

$$\Delta z = -1 * \frac{C_1}{C_2} * R_{ref}$$

With $R_{ref} = 50mm$, $C_2 = 10000 \text{ units}$, \rightarrow need 200 units C_1 for $\Delta z = 1mm$

Magnet frame
wrt building

