

DistoX - Advanced

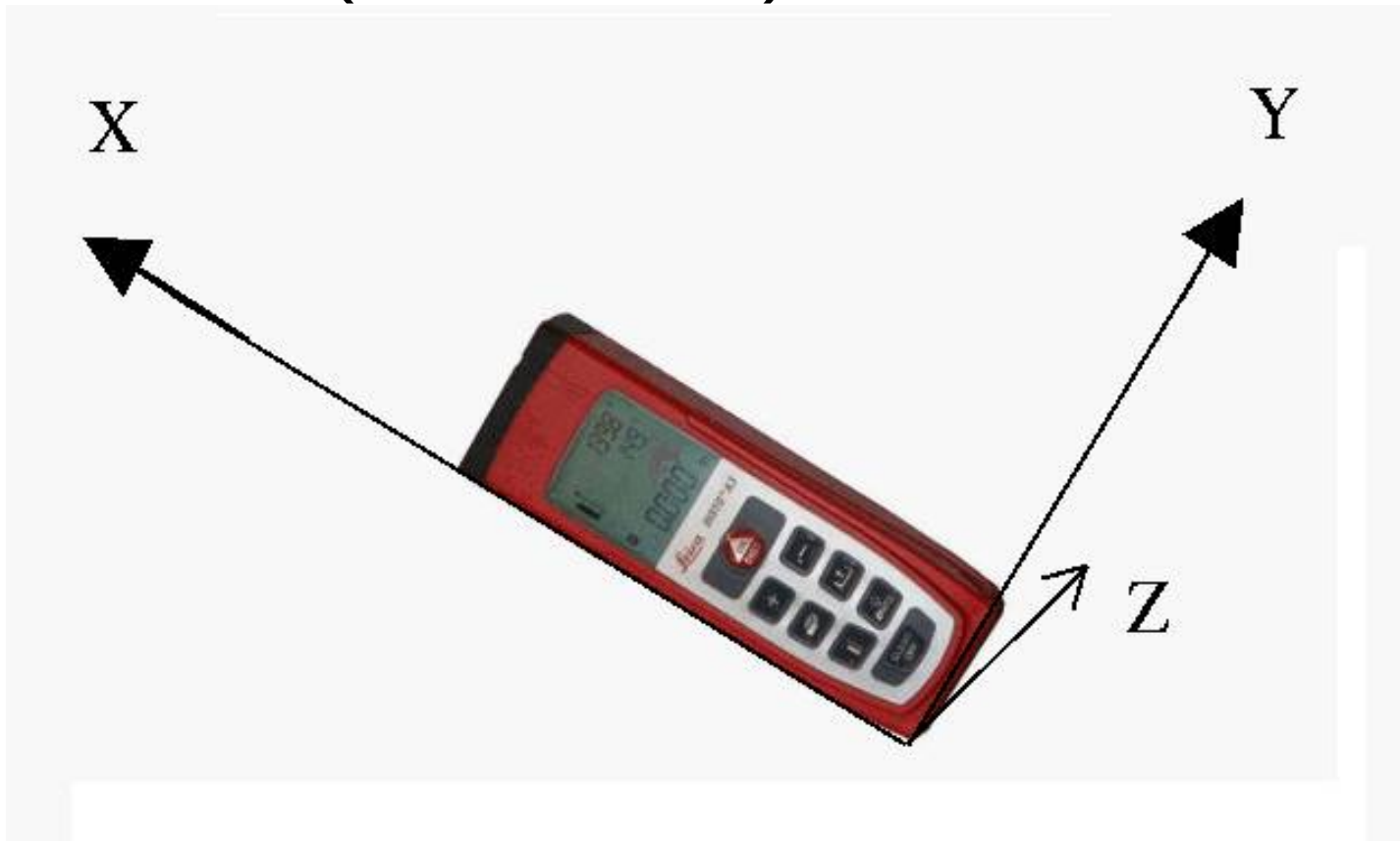
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DistoX frame of reference

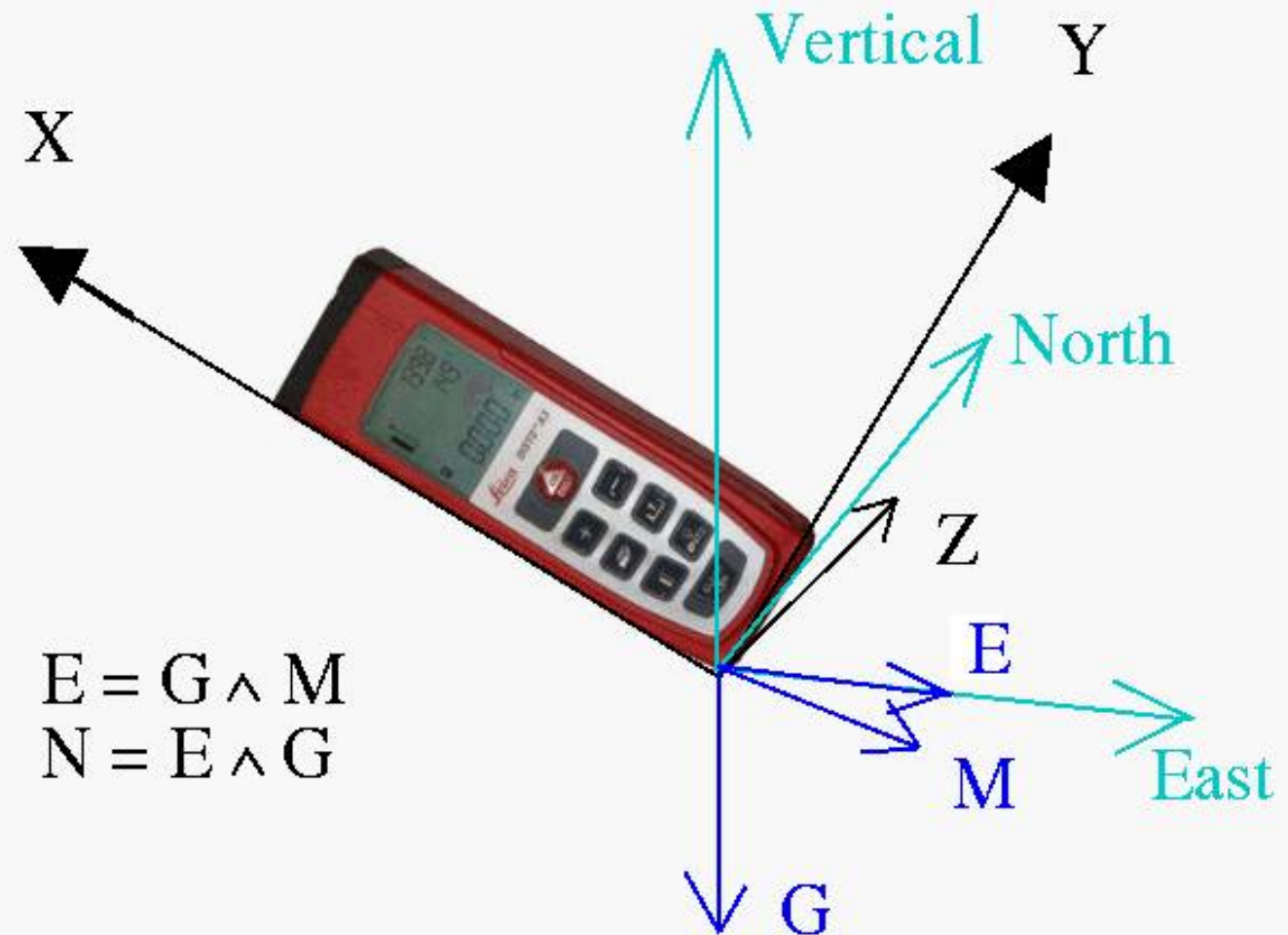
- X: long axis (laser axis)
- Y: middle axis (to the right)
- Z: short axis (to the back)



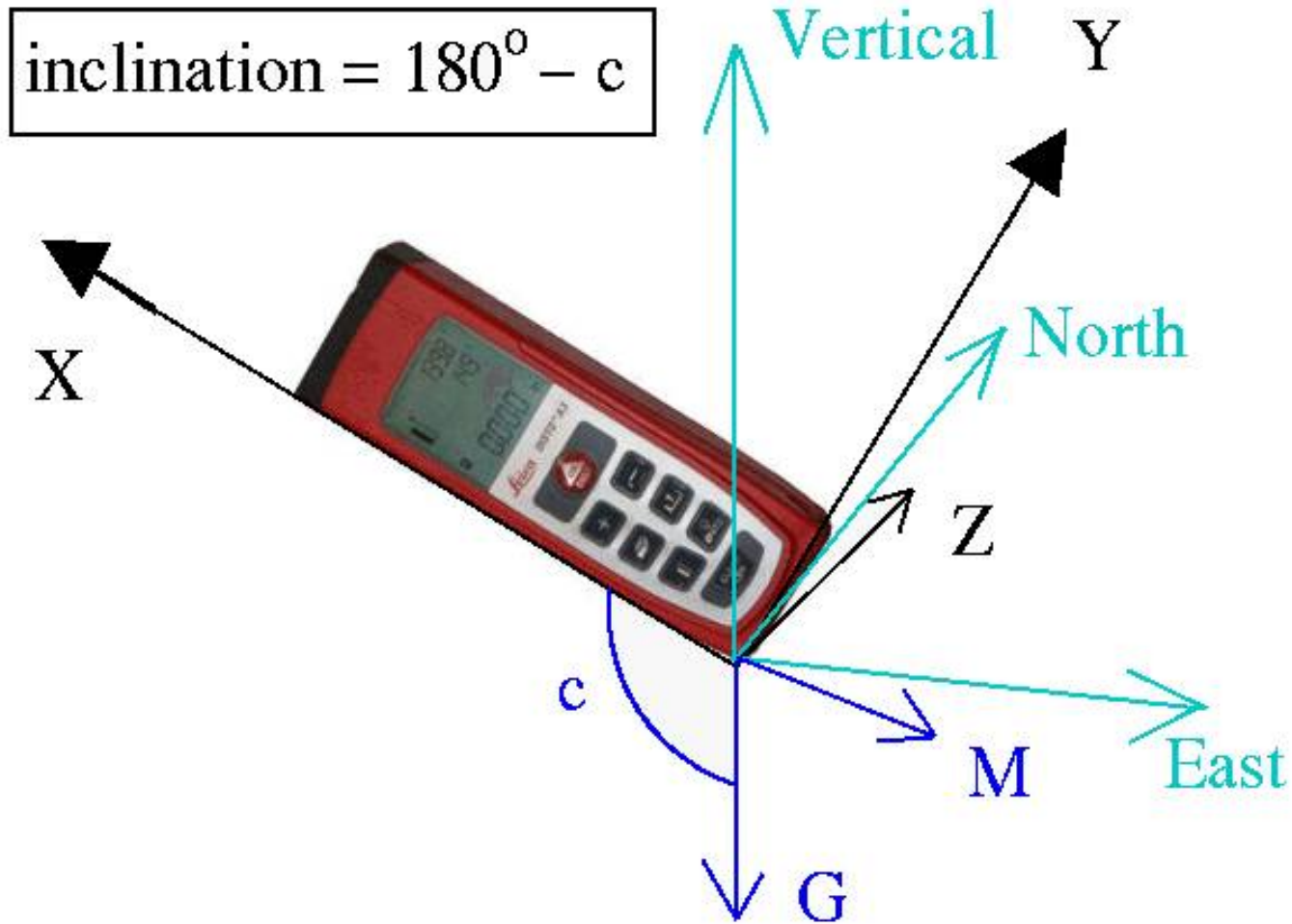
DistoX frame and Earth frame

- G along the vertical (downward)
- M in the North-Vertical plane

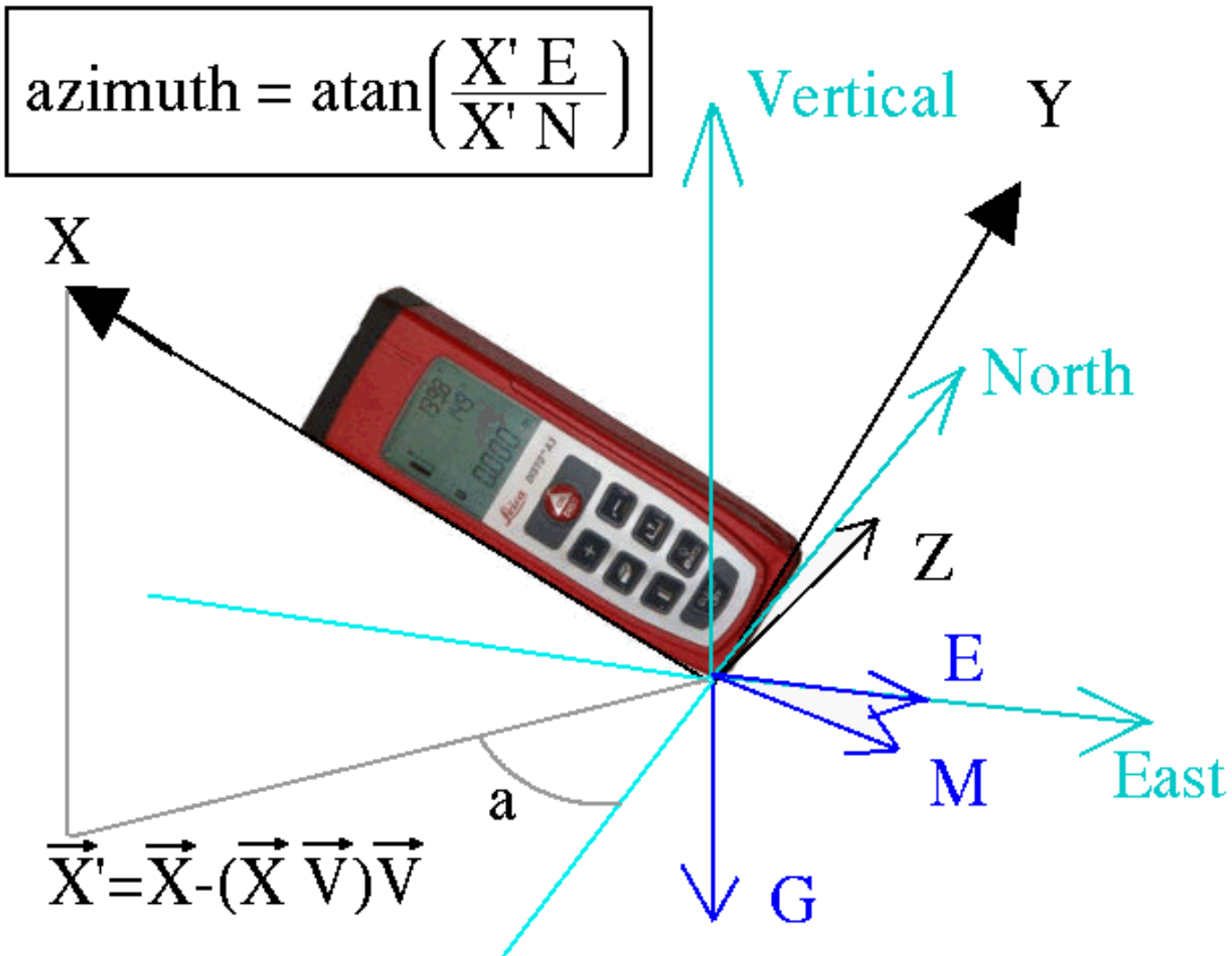
Magnetic North



From G, M to inclination



From G, M to azimuth



From G, M to azimuth, inclination

$$\begin{aligned}\text{inclination} &= 180^\circ - \text{acos}(X G) \\ &= 180^\circ - \text{acos}(G_x)\end{aligned}$$

$$\text{azimuth} = \text{atan}\left(\frac{X' E}{X' N}\right) = \text{atan}\left(\frac{E_x}{N_x}\right)$$

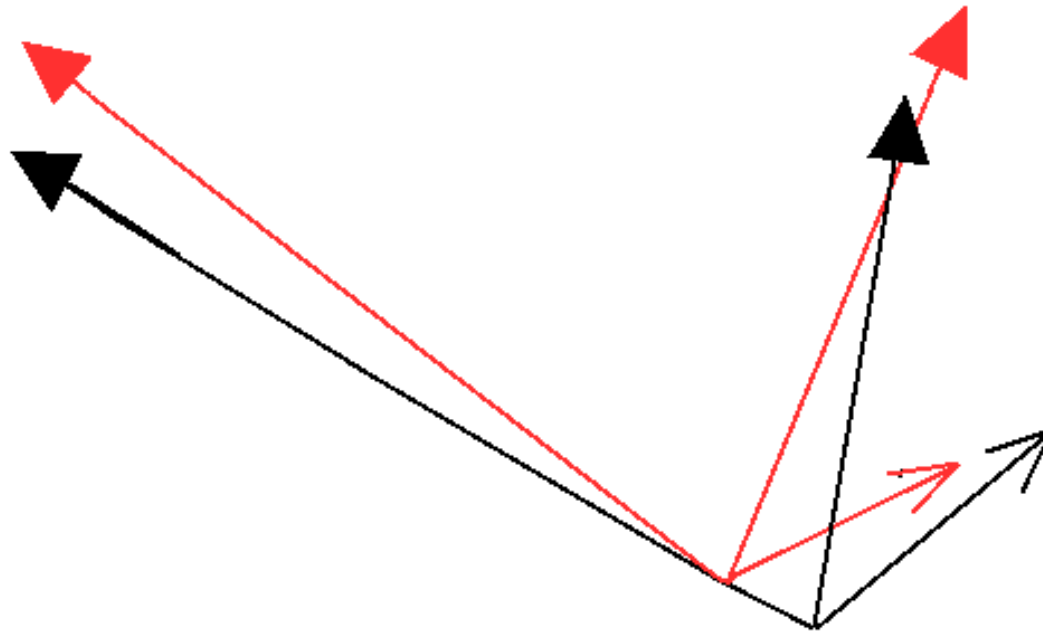
$$X' = X + (X G) V$$

$$X = (X E) E + (X G) G + (X V) V$$

$$X' = (X E) E + (X G) G$$

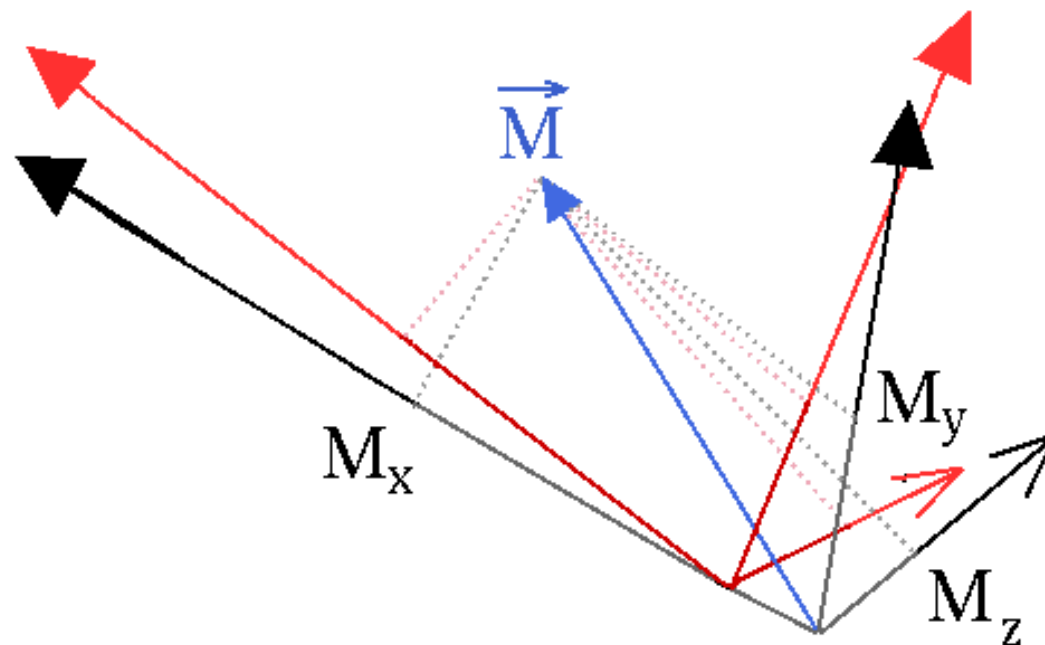
Sensors axes in DistoX frame

- Not aligned to the axes
- With offsets (biases) and gains



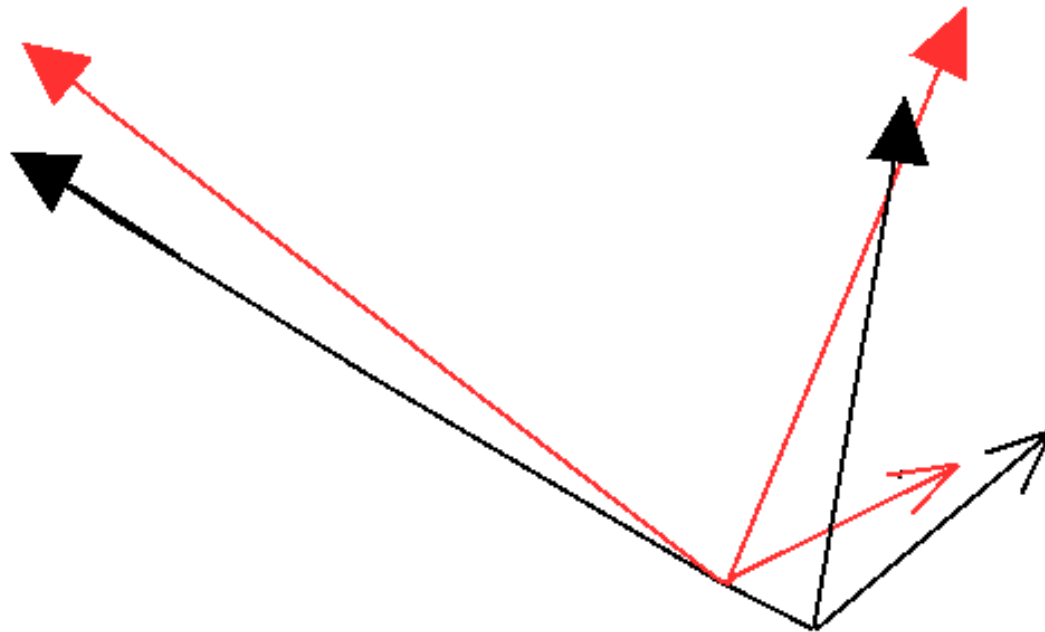
Vector M in the two frames

Components of the vector \vec{M} ,
in the DistoX frame of reference,
and in the sensors' frame of reference



DistoX calibration

Calibration : transformation that converts G, M in the sensors' frame to G, M in the DistoX frame



Calibration transformation

$$G = B_G + A_G \mathbf{G}$$
$$M = B_M + A_M \mathbf{M}$$

non-linear terms here (3)

24 coefficients

