0.1 Fehlerrechnung

Mittelwert:

$$\overline{T} = \frac{1}{N}\sum_{k=1}^{N} T_k \tag{1}$$

Mittelwertfehler:

$$\Delta T = \frac{\sigma}{\sqrt{N}} \qquad \sigma = \sqrt{\frac{1}{N-1}\sum_{i=1}^{N}(\overline{T} - T_i)^2} \tag{2}$$

Gaußsche Fehlerfortpflanzung:

ΔT:

$$\Delta T = \frac{2\pi}{\omega^2}\Delta\omega \tag{3}$$

$\Delta\omega$:

$$\Delta\omega = \frac{2\pi}{T^2}\Delta T \tag{4}$$

$\Delta\omega_+$:

$$\Delta\omega_+ = \frac{1}{2}\sqrt{\frac{1}{g\cdot l}\Delta g^2 + \frac{g}{l^3}\Delta l^2} \tag{5}$$

$\Delta\omega_-$:

$$\Delta\omega_- = \frac{1}{\sqrt{l}\cdot(g+2K)}\cdot\sqrt{\left(\frac{1}{2}\Delta g\right)^2 + \Delta K^2 + \left(\frac{g+2K}{2l}\Delta l\right)^2} \tag{6}$$

ΔT_{S}:

$$\Delta T_{\mathrm{S}} = \frac{1}{(T_+ - T_-)^2}\cdot\sqrt{T_-^4\,\Delta T_-^2 + T_+^4\,\Delta T_+^2} \tag{7}$$

$\Delta\omega_{\mathrm{S}}$:

$$\Delta\omega_{\mathrm{S}} = \sqrt{\Delta\omega_+^2 + \Delta\omega_-^2} \tag{8}$$

ΔK:

$$\Delta K = \frac{4T_+ T_-}{(T_+^2 + T_-^2)^2}\cdot\sqrt{T_-^2\,\Delta T_+^2 + T_+^2\,\Delta T_-^2} \tag{9}$$

1