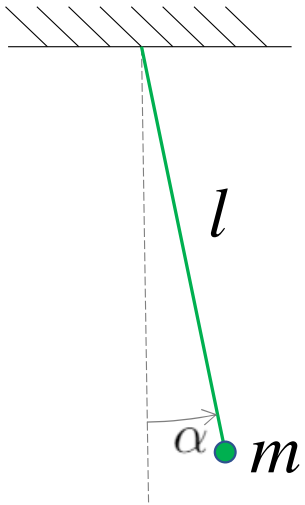
Aproximaciones del modelo del péndulo ideal o matemático

$$T_{ideal} = 2\,\pi \sqrt{\frac{l}{g}}$$

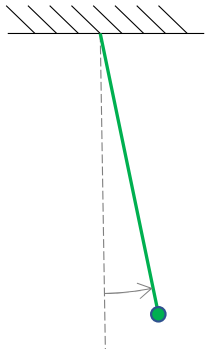
- Oscilaciones pequeñas
- Masa puntual
- Hilo de masa nula
- Hilo inextensible
- Colgado de un punto fijo
- Sin rozamiento

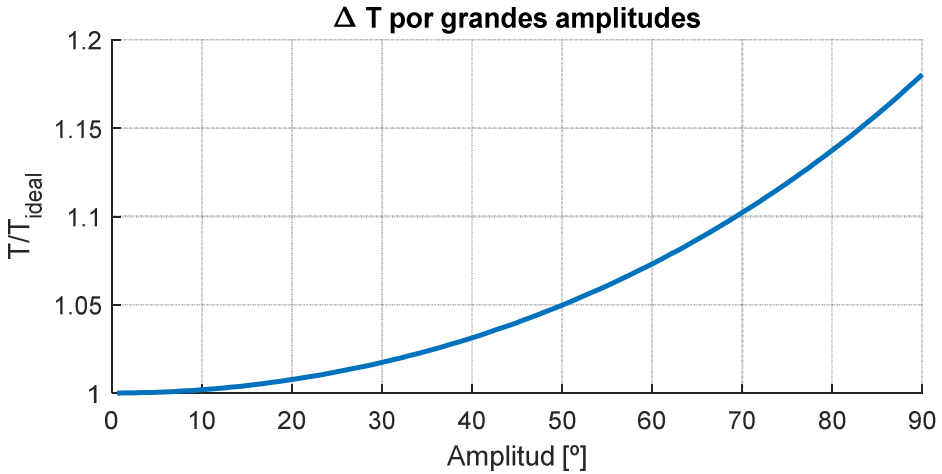


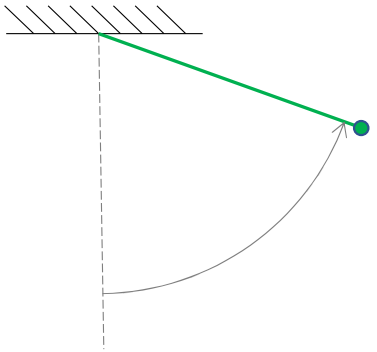
Medina, C. et al (2002). Control Experimental del Modelo de Péndulo Matemático. *Revista Brasileira de Ensino de Física*, *24*(2), 254-258. https://doi.org/10.1590/S1806-11172002000200023

$$\alpha \ll 1$$

$$T_\alpha = 2\pi\sqrt{\frac{l}{g}}\left(1 + \frac{1^2}{2^2}sen^2(\alpha/2) + \frac{1^2 \cdot 3^2}{2^2 \cdot 4^2}sen^4(\alpha/2) + \ldots\right)$$



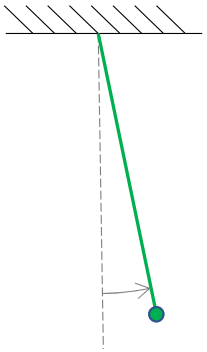


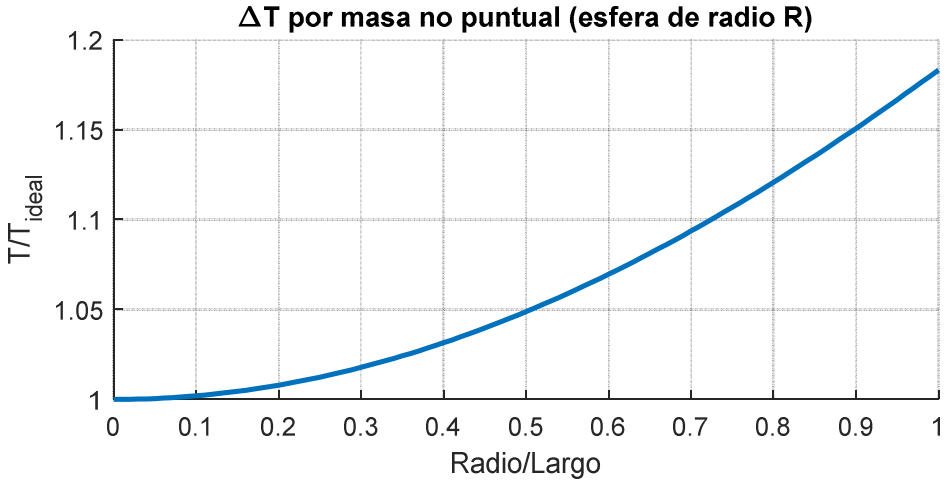


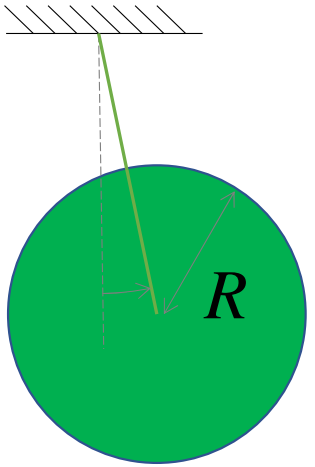
$$R \ll l$$

$$T = 2\,\pi \sqrt{\frac{I}{m\,g\,l}}$$

$$I = \frac{2}{5} m R^2 + m\,l^2$$





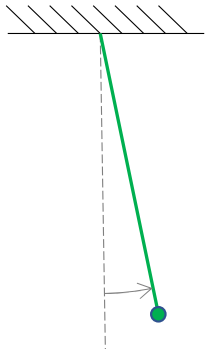


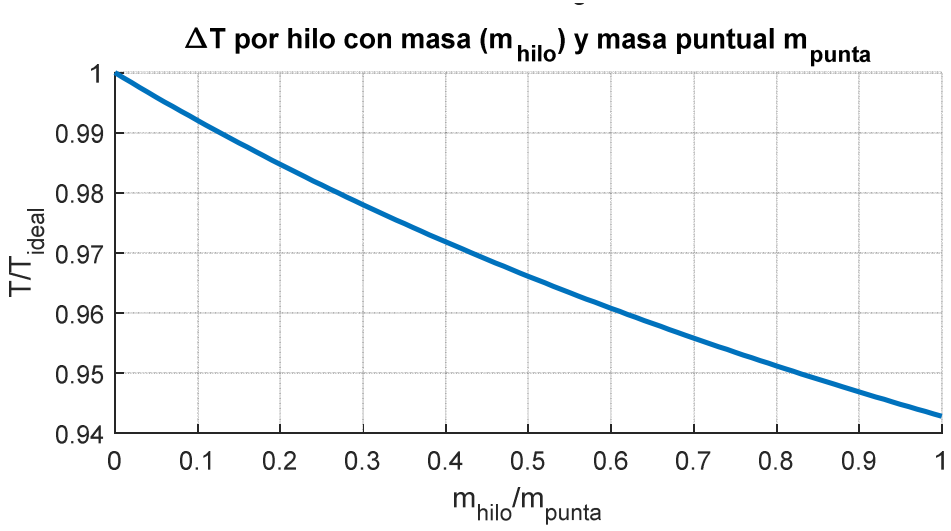
$$T = 2\,\pi \sqrt{\frac{I}{(m_\circ + m_{hilo})\, g\, d}}$$

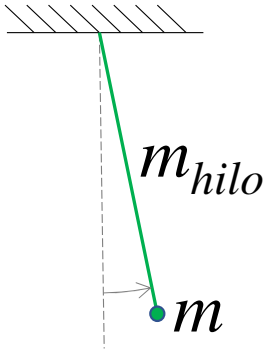
$$m_{hilo} \ll m_\circ$$

$$I = m_\circ\, l^2 + 1/3\, m_{hilo}\, l^2$$

$$d = \frac{m_\circ\, l + m_{hilo}\, l/2}{m_\circ + m_{hilo}}$$







- Oscilaciones pequeñas → $\alpha \ll 1$
- Masa puntual → $R \ll l$
- Hilo de masa nula → $m_{hilo} \ll m_{\circ}$
- Hilo inextensible ⇢ $\Delta l \ll l$
- Colgado de un punto fijo …
- Sin rozamiento …

Modelo ⇔ experimento