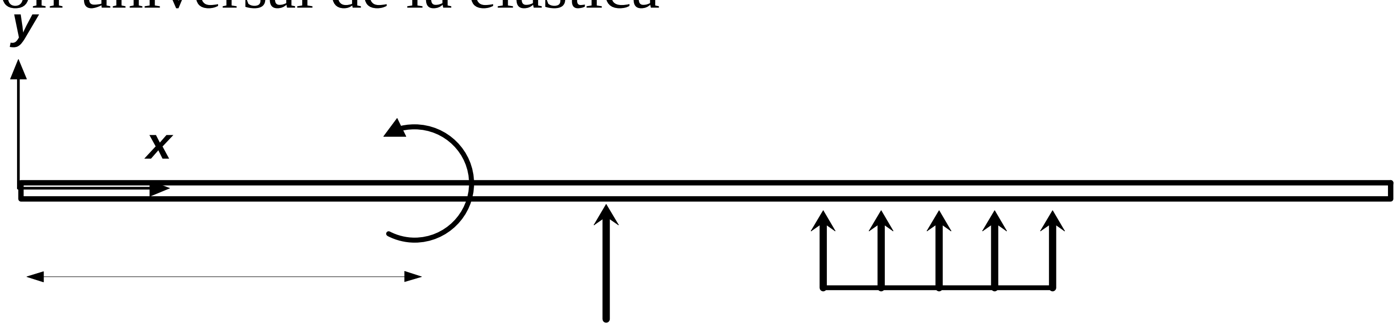
Ecuación universal de la elástica

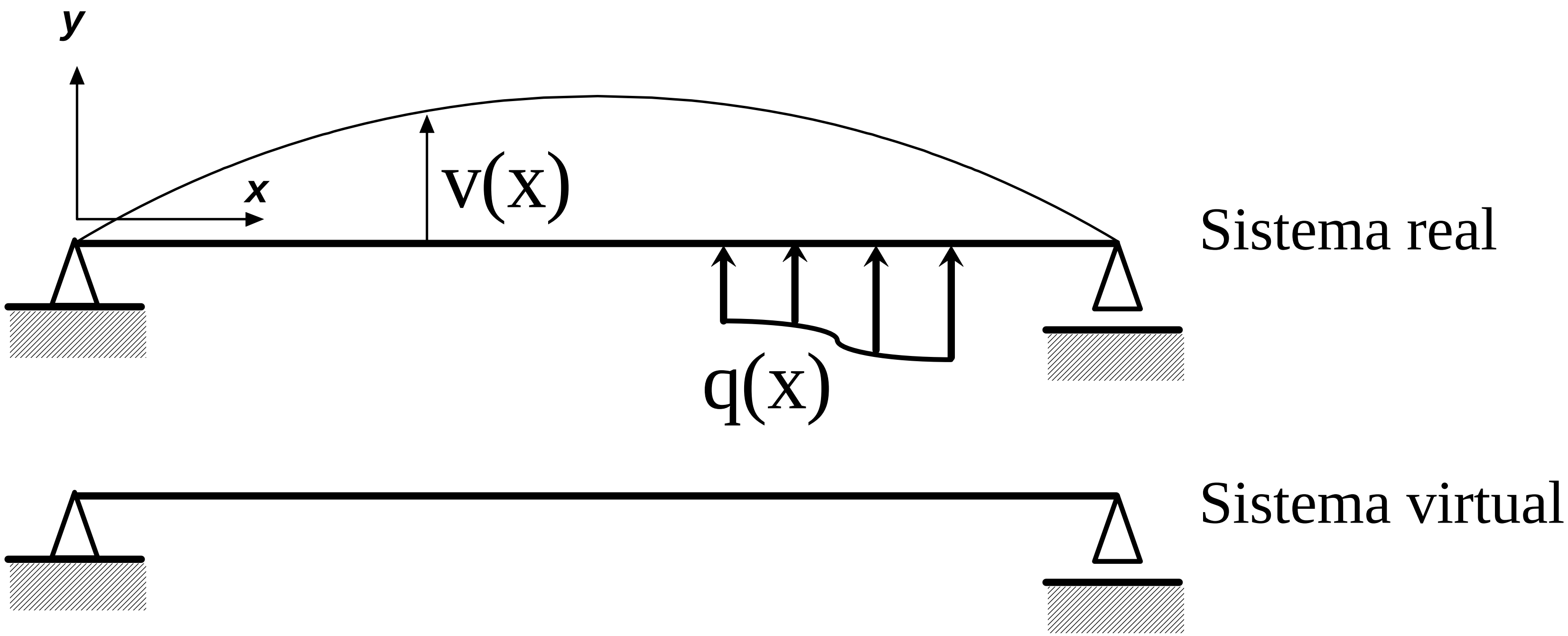


$$EI_z v(x) = EI_z v(0) + EI_z v'(0) \quad - \quad m_i \frac{\langle x - a_i \rangle}{} +$$

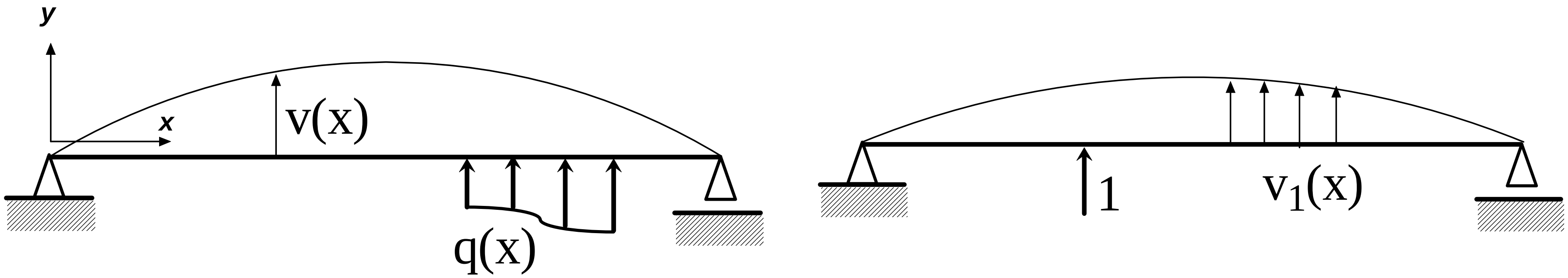
$$+ \quad P_i \frac{\langle x - b_i \rangle}{} + \quad q_i \frac{\langle x - c_i \rangle^4 - \langle x - d_i \rangle^4}{4!}$$

$$\langle x - s \rangle^n = \begin{cases} \\ \end{cases}$$

Método de la carga unidad



Demostración



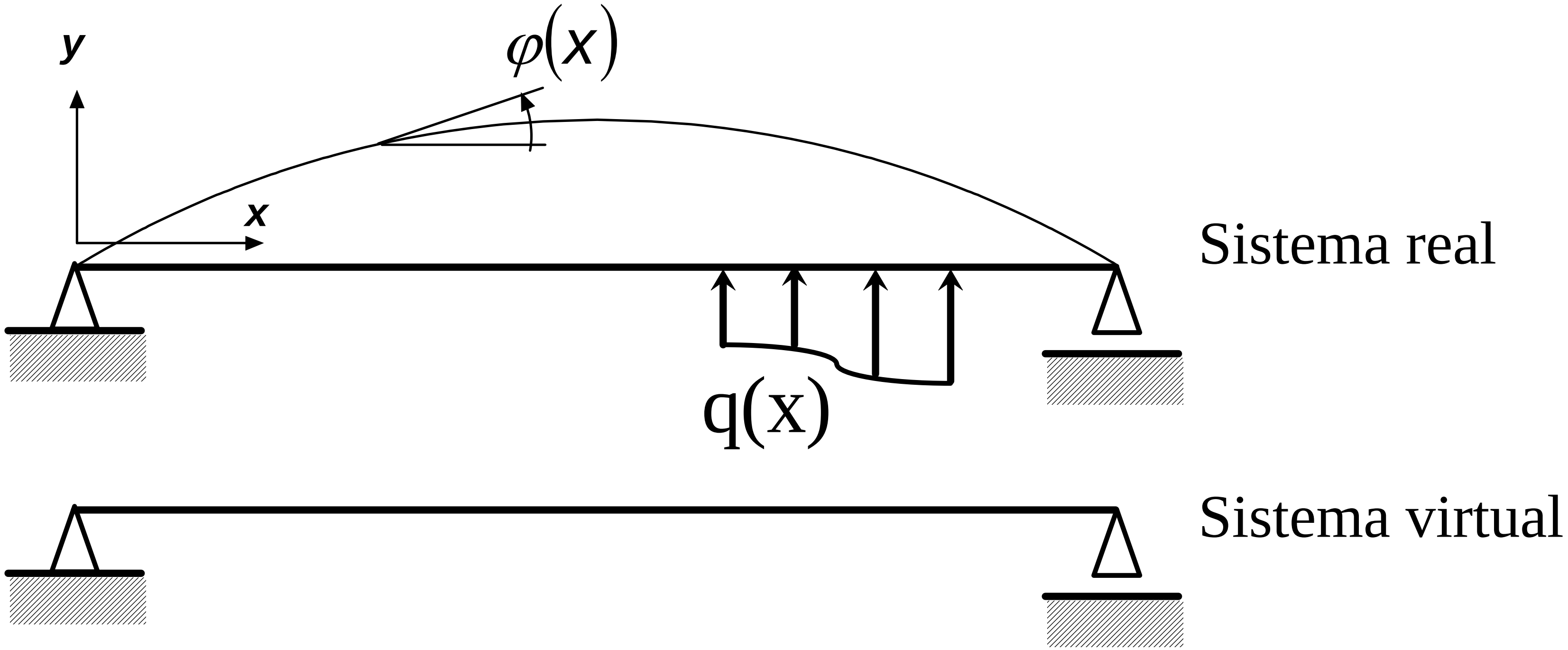
Maxwell-Betti: $$1 \cdot v(x) = \int_0^L q(x) \cdot v_1(x)\,dx$$

$$\int_0^L q(x) \cdot v_1(x)\,dx = \iiint \sigma_x \varepsilon_{x1}\,dV$$

$$\sigma_x = -\frac{M_z}{I_z} y \quad \varepsilon_{x1} = -\frac{M_{z1}}{EI_z} y \quad \rightarrow \quad v(x) = \iiint \frac{M_z(x) M_{z1}(x)}{EI_z{}^2(x)} y^2\,dV$$

$$v(x) = \int_0^L \frac{M_z(x) M_{z1}(x)}{EI_z{}^2(x)} \left[\iint_A y^2\,dA \right] dx \rightarrow v(x) = \int_0^L \frac{M_z \cdot M_{z1}}{EI_z}\,dx$$

Método del par unidad



$$v(x) = \int_0^L \frac{M_z \cdot M_{z1}}{EI_z} dx$$