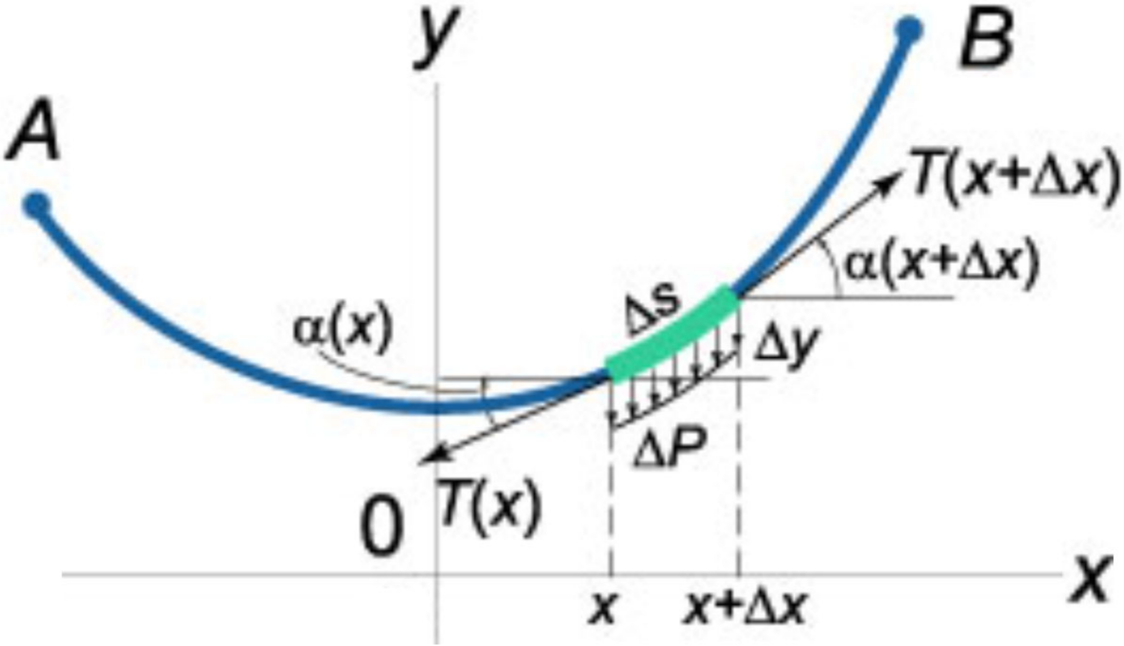

$\Delta P = \rho \cdot g \cdot A \cdot \Delta s$ A - chain cross section

$$T(x) \cdot cos(\alpha(x)) = T(x+\Delta x) \cdot cos(\alpha(x+\Delta x))$$

$$T(x) \cdot sin(\alpha(x)) = T(x+\Delta x) \cdot sin(\alpha(x+\Delta x)) + \Delta P$$

$$T(x) \cdot cos(\alpha(x)) = T_0 \qquad T(x) = \frac{T_0}{cos(\alpha(x))}$$

$$d(T(x) \cdot sin(\alpha(x))) = dP(x)$$

$$d\left(\frac{T_0}{cos(\alpha(x))} \cdot sin(\alpha(x))\right) = dP(x) \qquad d(T_0 \cdot tan(\alpha(x))) = dP(x)$$

$$tan(\alpha(x)) = \frac{\mathrm{d}}{\mathrm{d}x} y(x) = y'(x)$$

$$T_0 \cdot d(y'(x)) = \rho \cdot g \cdot A \cdot ds \qquad ds = \sqrt{1+y'(x)^2}$$

$$T_0 \cdot y''(x) = \rho \cdot g \cdot A \cdot \sqrt{1+y'(x)^2} \qquad z(x) = y'(x)$$

$$T_0 \cdot z'(x) = \rho \cdot g \cdot A \cdot \sqrt{1+z(x)^2} \qquad T_0 \cdot \frac{\mathrm{d}}{\mathrm{d}x} z(x) = \rho \cdot g \cdot A \cdot \sqrt{1+z(x)^2}$$

$$\frac{dz}{\sqrt{1+z(x)^2}} = \frac{\rho \cdot g \cdot A}{T_0} \cdot dx \qquad a = \frac{T_0}{\rho \cdot g \cdot A} \qquad \frac{N}{kg \cdot m \cdot m^2} = 1\ m$$

$\sqrt{1+z(x)}$ $\qquad$ $m^3 \quad s^2 \quad m$

$$\frac{dz}{\sqrt{1+z(x)^2}} = \frac{1}{a}\,dx \qquad dz = \frac{\sqrt{1+z(x)^2}}{a}\,dx$$

$$\int \frac{1}{\sqrt{1+z^2}}\,\mathrm{d}z \rightarrow -\ln\left(\sqrt{z^2+1}-z\right) \qquad y'(0)=0 \qquad C=0$$

$$z+\sqrt{1+z^2} = e^{\frac{x}{a}} \xrightarrow{\substack{solve,z\\ simplify}} \sinh\left(\frac{x}{a}\right) \qquad y'(x)=\sinh\left(\frac{x}{a}\right) \qquad \int \sinh\left(\frac{x}{a}\right)\mathrm{d}x \rightarrow a\cdot\cosh\left(\frac{x}{a}\right)$$

$$y(x) = a\cdot\cosh\left(\frac{x}{a}\right)$$