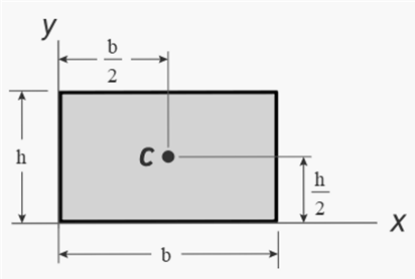
Source: Internet https://www.ingenieriaelemental.com/posts/es/momento-inercia-rectangulo

Solve Block Examples

Square plate inertia moment

$I_x := 125\ см^4$ $I_y := 45\ см^4$



$$\begin{cases} \frac{h \cdot b^3}{3} = I_x & \frac{h^3 \cdot b}{3} = I_y \\ h \approx 1\ см & b \approx 1\ см \end{cases}$$

$S := find\left(\begin{pmatrix} h \\ b \end{pmatrix}\right)$

$h := S_1 = 3\ см$

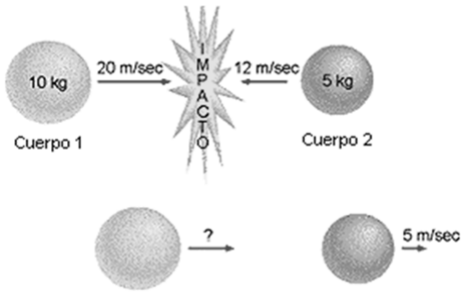
$b := S_2 =$

$S = \begin{bmatrix} 3 \\ 5 \end{bmatrix}\ см$

$find = "NewtonRaphson"$

Source: Mathcad' Study Works Handbook $find := "Broyden"$

Momentum conservation



$m_1 := 10\ кг$ $m_2 := 5\ кг$

$v_{i1} := 20\ \frac{м}{с}$ $v_{i2} := -12\ \frac{м}{с}$

$v_{f1} = ?$ $v_{f2} := 5\ \frac{м}{с}$

$$\begin{cases} m_1 \cdot v_{i1} + m_2 \cdot v_{i2} = m_1 \cdot v_{f1} + m_2 \cdot v_{f2} \\ v_{f1} \approx 1\ \frac{м}{с} \end{cases}$$

$v_{f1} := find\left(\begin{pmatrix} v_{f1} \end{pmatrix}\right)$

$v_{f1} = 11.5\ \frac{м}{с}$

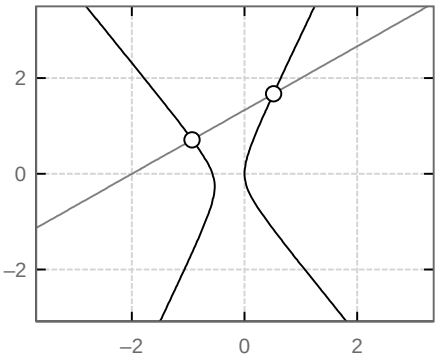
Conic and line intersection

Parametrized solution $find := "NewtonRaphson"$

$$\begin{cases} C := 7 \cdot x^2 + 2 \cdot x \cdot y - 2 \cdot y^2 + 4 \cdot x \\ r := 2 \cdot x - 3 \cdot y + 4 \end{cases}$$

$$\begin{cases} C = 0 & r = 0 \\ x \approx xo & y \approx 0 \end{cases}$$

$S(xo) := find\left(\begin{pmatrix} x \\ y \end{pmatrix}\right)$



$A := S(-1) = \begin{bmatrix} -0.9309 \\ 0.7127 \end{bmatrix}$

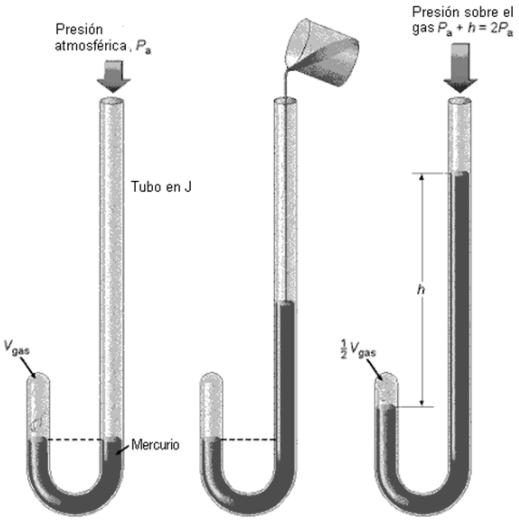
$B := S(1) = \begin{bmatrix} 0.513 \\ 1.6754 \end{bmatrix}$

$$\begin{pmatrix} C \\ r \\ augment\left(\begin{bmatrix} -0.9309 \\ 0.7127 \end{bmatrix}, \begin{bmatrix} 0.513 \\ 1.6754 \end{bmatrix}\right)^T \end{pmatrix}$$

$find = "NewtonRaphson"$

Source: Spanish version of Technische Formelsammlung, Gieck (brothers?)

Boyle's Law



$d := 1\ мм$

$h := 4\ м$

$p_2 := 1\ атм$

$\rho := 998.3\ \frac{г}{л}$

$$\begin{cases} p_1 = p_2 + \rho \cdot g_з \cdot h \\ V_1 = \frac{4}{3} \cdot \pi \cdot \left(\frac{d}{2}\right)^3 \\ p_1 \cdot V_1 = p_2 \cdot V_2 \\ p_1 \approx 1\ атм \\ V_1 \approx 1\ мм^3 \end{cases} \qquad V_2 \approx 1\ мм^3$$

$S := find\left(\begin{Bmatrix} p_1 \\ V_1 \\ V_2 \end{Bmatrix}\right)$

$p_1 := S_1 = 1.3865\ атм$

$V_1 := S_2 = ▮\ мм^3$

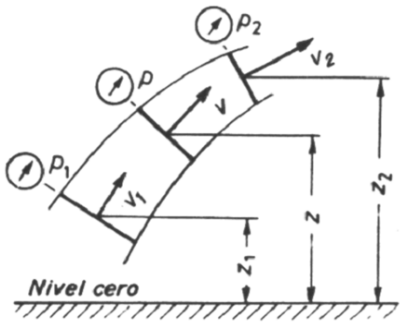
$V_2 := S_3 = ▮\ мм^3$

$find = "NewtonRaphson"$

$$S = \begin{bmatrix} 1.4048 \cdot 10^5\ \frac{кг}{м\ с^2} \\ 5.236 \cdot 10^{-10}\ м^3 \\ 7.2596 \cdot 10^{-10}\ м^3 \end{bmatrix}$$

$find := "Broyden"$

Frictionless Bernoulli



$\rho := 1120\ \frac{г}{л}$

$p_1 := 4\ атм$ $\qquad p_2 := 3\ атм$

$v_1 := 6\ \frac{м}{с}$ $\qquad v_2 := 8\ \frac{м}{с}$

$z_1 := 0.1\ м$ $\qquad z_2 = ?$

$$\begin{cases} \frac{p_1}{\rho} + g_з \cdot z_1 + \frac{v_1^2}{2} = \frac{p_2}{\rho} + g_з \cdot z_2 + \frac{v_2^2}{2} \\ z_2 \approx 1\ м \end{cases}$$

$z_2 := find\left(\{z_2\}\right)$

$z_2 = 7.8976\ м$

$Clear\left(p_1\right) = 1$

$find = "Broyden"$

Alvaro $\qquad appVersion(4) = "1.73.9126.0"$