Équations importantes du tome C (Modifications apportées par Simon Vézina)

$$x = A\sin(\omega t + \phi) \qquad \omega = \frac{2\pi}{T}$$
$$v_{\max} = A\omega \qquad a_{\max} = A\omega^2$$
$$a_x = -\omega^2 x$$

$$\omega_0 = \sqrt{\frac{k}{m}} \qquad \omega_0 = \sqrt{\frac{g}{L}}$$

$$\theta = \theta_{\max}\sin(\omega t + \phi)$$
$$\omega_0 = \sqrt{\frac{mgh}{I}}$$
$$I = mh^2 + I_{\mathrm{CM}}$$

$$U = \tfrac{1}{2}m\omega^2 x^2$$
$$E = \tfrac{1}{2}m\omega^2 A^2$$

$$\vec{F}_{\mathrm{am}} = -b\vec{v}$$
$$\omega' = \sqrt{\frac{k}{m} - \left(\frac{b}{2m}\right)^2}$$
$$x = A_0 e^{-\frac{b}{2m}t}\sin(\omega' t + \phi)$$

$$\lambda = vT = \frac{v}{f}$$
$$v_{\mathrm{s}} = 340\ \mathrm{m/s}$$
$$v = \sqrt{\frac{F}{\mu}} \qquad \mu = \frac{m}{L}$$

$$y = A\sin(kx \pm \omega t + \phi)$$
$$k = \frac{2\pi}{\lambda} \qquad \overline{P} = \tfrac{1}{2}\mu v\omega^2 A^2$$

$$C_{\mathrm{R}} = \frac{A_{\mathrm{R}}}{A_{\mathrm{I}}} = \frac{1 - \sqrt{\mu_2/\mu_1}}{1 + \sqrt{\mu_2/\mu_1}}$$
$$C_{\mathrm{T}} = \frac{A_{\mathrm{T}}}{A_{\mathrm{I}}} = \frac{2}{1 + \sqrt{\mu_2/\mu_1}}$$

$$f' = \left(\frac{v_{\mathrm{sR}}}{v_{\mathrm{sE}}}\right)f$$
$$f' = \left(\frac{v_{\mathrm{s}} \pm v_{\mathrm{R}}}{v_{\mathrm{s}} \pm v_{\mathrm{E}}}\right)f$$

$$y = A_{\mathrm{stat}}\cos(\omega t)\sin(kx)$$

$$f_{\mathrm{b}} = |f_1 - f_2|$$

$$I = \frac{P}{A} \qquad \beta = 10\log\left(\frac{I}{I_0}\right)$$
$$I_0 = 10^{-12}\ \mathrm{W/m^2}$$

$$g = \frac{y_{\mathrm{i}}}{y_{\mathrm{o}}} \qquad G = \frac{\alpha_{\mathrm{i}}}{\alpha_{\mathrm{o}}}$$

$$\theta' = \theta \qquad f = \frac{R}{2}$$
$$\frac{1}{p} + \frac{1}{q} = \frac{1}{f} \qquad \frac{y_{\mathrm{i}}}{y_{\mathrm{o}}} = -\frac{q}{p}$$

$$n = \frac{c}{v} \qquad n_2\sin\theta_2 = n_1\sin\theta_1$$

$$\frac{n_1}{p} + \frac{n_2}{q} = \frac{n_2 - n_1}{R}$$
$$\frac{y_{\mathrm{i}}}{y_{\mathrm{o}}} = -\frac{n_1}{n_2}\frac{q}{p}$$

$$\frac{1}{p} + \frac{1}{q} = \frac{1}{f} \qquad \frac{y_{\mathrm{i}}}{y_{\mathrm{o}}} = -\frac{q}{p}$$
$$\frac{1}{f} = (n_{\mathrm{L}} - 1)\left(\frac{1}{R_{\mathrm{A}}} - \frac{1}{R_{\mathrm{B}}}\right)$$

$$A_{\mathrm{acc}} = V_{\max} - V_{\min}$$
$$V = \frac{1}{f} \qquad A_{\mathrm{acc}} = \frac{1}{d_{\mathrm{PP}}} - \frac{1}{d_{\mathrm{PR}}}$$

$$\frac{n_1}{p} + \frac{n_2}{q} = V \qquad V = \sum V_i$$
$$V = \frac{n_{\mathrm{L}} - n_1}{R_{\mathrm{A}}} - \frac{n_{\mathrm{L}} - n_2}{R_{\mathrm{B}}}$$

$$G_{\mathrm{com}} = \frac{\alpha_{\mathrm{i}(\infty)}}{\alpha_{\mathrm{o(max)}}}$$
$$G_{\mathrm{com}} = \frac{(25\ \mathrm{cm})}{f}$$
$$G_{\mathrm{com}} = -\frac{f_{\mathrm{ob}}}{f_{\mathrm{oc}}}$$
$$G_{\mathrm{com}} = -\frac{(D - f_{\mathrm{ob}} - f_{\mathrm{oc}})}{f_{\mathrm{ob}}}\frac{(25\ \mathrm{cm})}{f_{\mathrm{oc}}}$$

$$\delta = |r_2 - r_1|$$
$$\delta_{\max} = m\lambda \qquad \delta_{\min} = (m + \tfrac{1}{2})\lambda$$

$$\delta \approx d\sin\theta$$
$$\Delta\phi = \frac{\delta}{\lambda} \times (2\pi\ \mathrm{rad})$$
$$I_2 = 4I_1\cos^2\left(\frac{\Delta\phi}{2}\right)$$

$$\delta \approx a\sin\theta$$
$$\delta_{\min} = m\lambda$$
$$(m = \pm 1, \pm 2, \pm 3, \ldots)$$
$$\theta_{\lim} = \frac{\lambda}{a} \qquad \theta_{\lim} = 1{,}22\frac{\lambda}{D}$$
$$I = I_0\frac{\sin^2(\Delta\phi_a/2)}{(\Delta\phi_a/2)^2}$$

$$\frac{\lambda'}{\lambda} = \frac{n}{n'} \qquad n_1\lambda_1 = n_2\lambda_2$$

$$I' = I\cos^2\theta$$

$$\gamma = \frac{1}{\sqrt{1 - (v/c)^2}}$$
$$\gamma \approx 1 + \frac{1}{2}\left(\frac{v}{c}\right)^2$$
$$T = \gamma\, T_0 \qquad L = \frac{L_0}{\gamma}$$

$$\tau = \frac{L_0}{c}\frac{v}{c}$$

$$\Delta x_{\mathrm{B}} = \gamma(\Delta x_{\mathrm{A}} + v_{x\mathrm{AB}}\Delta t_{\mathrm{A}})$$
$$\Delta t_{\mathrm{B}} = \gamma(\Delta t_{\mathrm{A}} + \frac{v_{x\mathrm{AB}}}{c^2}\Delta x_{\mathrm{A}})$$
ou
$$\Delta x_{\mathrm{B}} = \gamma(\Delta x_{\mathrm{A}} - v_{x\mathrm{BA}}\Delta t_{\mathrm{A}})$$
$$\Delta t_{\mathrm{B}} = \gamma(\Delta t_{\mathrm{A}} - \frac{v_{x\mathrm{BA}}}{c^2}\Delta x_{\mathrm{A}})$$

$$v_{x\mathrm{AR}} = \frac{v_{x\mathrm{AB}} + v_{x\mathrm{BR}}}{1 + \left(\frac{v_{x\mathrm{AB}}}{c}\right)\left(\frac{v_{x\mathrm{BR}}}{c}\right)}$$

$$f' = \sqrt{\frac{c \pm v}{c \mp v}}\, f$$

$$\vec{p} = \gamma m\vec{v} \qquad F = \gamma^3 ma$$
$$K = (\gamma - 1)mc^2 \qquad E_0 = mc^2$$
$$E = E_0 + K = \gamma mc^2$$
$$E^2 = p^2c^2 + m^2c^4$$

$$E = hf \qquad E = pc$$

$$\lambda' - \lambda = \frac{h}{mc}(1 - \cos\theta)$$

$$\lambda_{\max} = \frac{(0{,}0029\ \mathrm{m{\cdot}K})}{T}$$
$$I = \sigma T^4$$

$$\lambda = h/p$$

$$\Delta p_x\,\Delta x > h \qquad \Delta E\,\Delta t > h$$

$$2\pi r = n\lambda \qquad E = \frac{(-13{,}6\ \mathrm{eV})}{n^2}$$

$$E_{\mathrm{L}} = \Delta m\, c^2$$
$$Q = (\sum m_{\mathrm{i}} - \sum m_{\mathrm{f}})c^2$$

$$N = N_0 e^{-\lambda t}$$
$$T_{1/2} = \ln 2/\lambda \qquad R = \lambda N$$

Valeurs numériques

$$g = 9{,}8\ \mathrm{m/s^2}$$
$$e = 1{,}6\times10^{-19}\ \mathrm{C}$$
$$1\ \mathrm{eV} = 1{,}6\times10^{-19}\ \mathrm{J}$$
$$k = 9\times10^9\ \mathrm{N{\cdot}m^2/C^2}$$
$$c = 3{,}00\times10^8\ \mathrm{m/s}$$
$$h = 6{,}63\times10^{-34}\ \mathrm{J{\cdot}s}$$
$$T(\mathrm{K}) = T(°\mathrm{C}) + 273{,}15$$
$$\sigma = 5{,}67\times10^{-8}\ \mathrm{W/(m^2{\cdot}K^4)}$$
$$1\ \mathrm{u} = 1{,}660\ 539\times10^{-27}\ \mathrm{kg}$$
$$m_{\mathrm{p}} = 1{,}007\ 276\ \mathrm{u}$$
$$m_{\mathrm{n}} = 1{,}008\ 665\ \mathrm{u}$$
$$m_{\mathrm{e}} = 9{,}11\times10^{-31}\ \mathrm{kg} = 0{,}000\ 549\ \mathrm{u}$$
$$1\ \frac{\mathrm{MeV}}{c^2} = 1{,}782\ 662\times10^{-30}\ \mathrm{kg}$$
$$1\ \mathrm{u} = 931{,}5\ \mathrm{MeV}/c^2$$

$$v_x = \frac{\mathrm{d}x}{\mathrm{d}t} \qquad a_x = \frac{\mathrm{d}v_x}{\mathrm{d}t}$$
$$a_{\mathrm{C}} = \frac{v^2}{r} \qquad f = \frac{1}{T}$$
$$\sum\vec{F} = m\vec{a} \qquad F_{\mathrm{r}} = k|e|$$
$$K_{\mathrm{f}} + U_{\mathrm{f}} = K_{\mathrm{i}} + U_{\mathrm{i}} + W_{\mathrm{nc}}$$
$$W = Fs\cos\theta_{Fs} \qquad K = \tfrac{1}{2}mv^2$$
$$U_{\mathrm{r}} = \tfrac{1}{2}ke^2 \qquad U_{\mathrm{g}} = mgy$$
$$E = K + U \qquad \overline{P} = \frac{\Delta(\text{énergie})}{\Delta t}$$
$$\vec{p} = m\vec{v} \qquad \sum\vec{p}_{\mathrm{f}} = \sum\vec{p}_{\mathrm{i}}$$
$$U_{\mathrm{e}} = qV$$

Relations mathématiques

Addition de sinus

$$\sin a + \sin b = 2\cos\tfrac{a-b}{2}\sin\tfrac{a+b}{2}$$