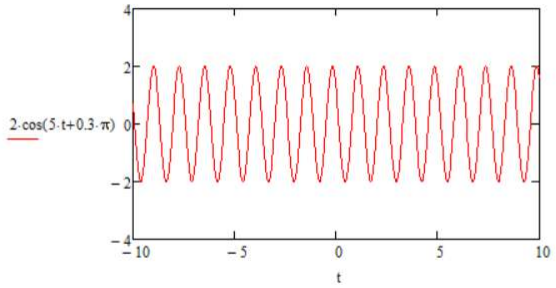
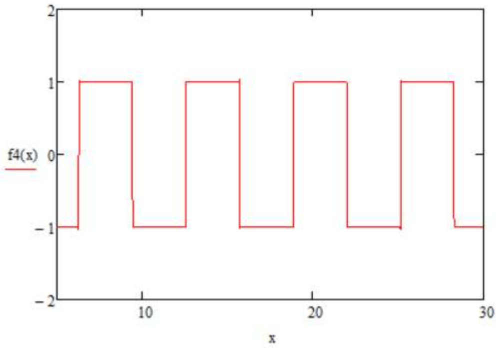


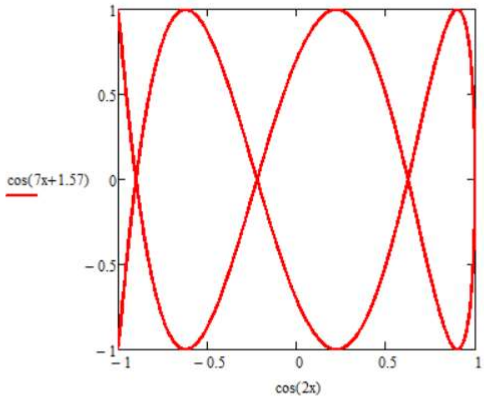
$$f1(t) := \sum_{k=0}^{0} \left[\frac{4}{\pi(2k+1)} \sin[(2k+1)\cdot t]\right]$$

$$f2(t) := \sum_{k=0}^{1000} \left[\frac{4}{\pi(2k+1)} \sin[(2k+1)\cdot t]\right]$$

$$f3(t) := \sum_{k=0}^{1000} \left[\frac{4}{\pi(2k+1)} \sin[(2k+1)\cdot t]\right]$$

$$f4(t) := \sum_{k=0}^{1000} \left[\frac{4}{\pi(2k+1)} \sin[(2k+1)\cdot t]\right]$$





$\omega 0 := 18 \qquad \beta := 0.5 \qquad h := 20 \qquad \omega := 1$

已知

$$\frac{d^2}{dt^2}x(t) + 2\cdot\beta\cdot\frac{d}{dt}x(t) + \omega 0^2\cdot x(t) = h\cdot\cos(\omega\cdot t)$$

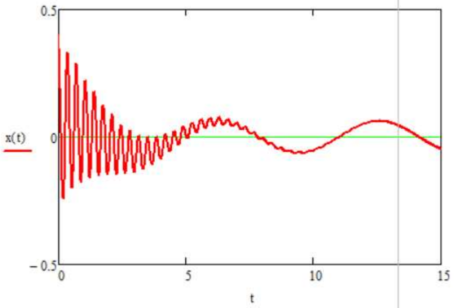
$x(0) = 0.4$

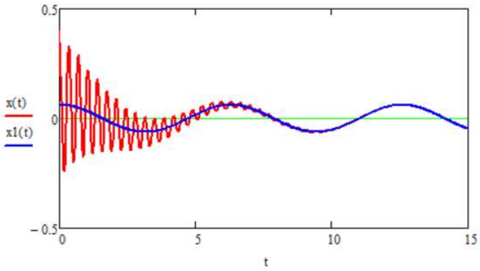
$x'(0) = 0.81$

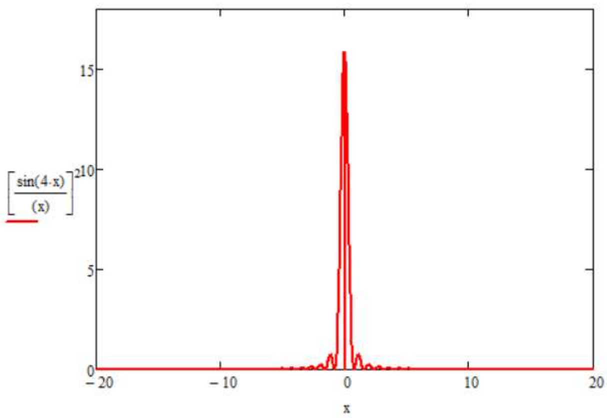
$x := \mathrm{Odesolve}(t, 100)$

$$A := \frac{h}{\left[\left(\omega 0^2 - \omega^2\right)^2 + 4\cdot\beta^2\cdot\omega^2\right]^{\frac{1}{2}}} \qquad \phi := \mathrm{atan}\left(\frac{-2\cdot\beta\cdot\omega}{\omega 0^2 - \omega^2}\right)$$

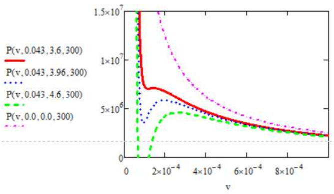
$x1(t) := A\cdot\cos(\omega\cdot t + \phi)$



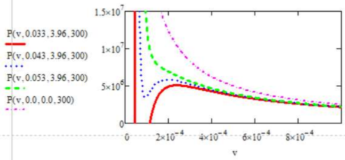




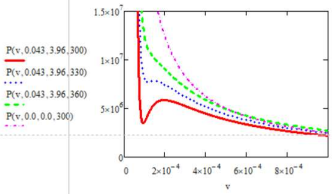
$$P(v, b, a, T) := \frac{8.31T}{\left(v - b\cdot 10^{-3}\right)} - \frac{0.1013\cdot a}{v^2}$$



changed with a



changed with b

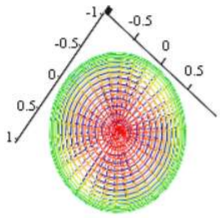


changed with T

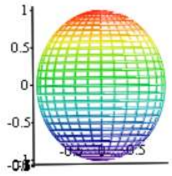
$N := 30$

$i := 0..N$ $\quad j := 0..N$ $\quad \theta_i := \frac{i \cdot \pi}{N}$ $\quad \phi_j := \frac{j \cdot 2 \cdot \pi}{N}$

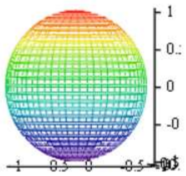
$X_{i,j} := \sin(\theta_i) \cdot \cos(\phi_j)$ $\quad Y_{i,j} := \sin(\theta_i) \cdot \sin(\phi_j)$ $\quad Z_{i,j} := \cos(\theta_i)$

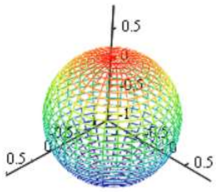


(X,Y,Z)



(X,Y,Z)



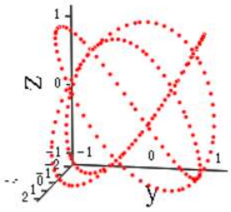


李萨如图的再认识（further understanding for Lissajous figures）：

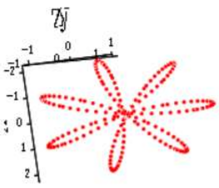
$\phi_1 := 0.0 \cdot \pi$ $\quad \phi_2 := 0.5 \cdot \pi$

$X(t) := 1.1\sin(4t + \phi_1) - 1.1\sin(3t + \phi_2)$ $\quad Y(t) := 1.1\cos(3 \cdot t + \phi_2)$

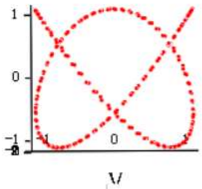
$Z(t) := 1.1\cos(4t + \phi_1)$



(X,Y,Z)



(X,Y,Z)



(X,Y,Z)