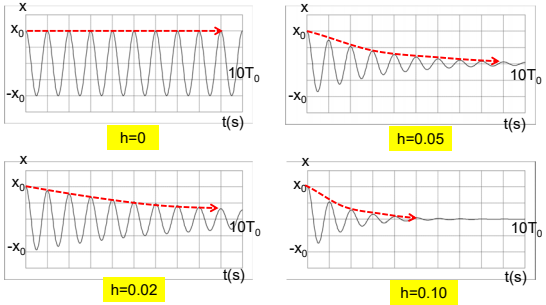
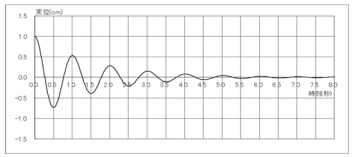
減衰定数による自由振動の違い

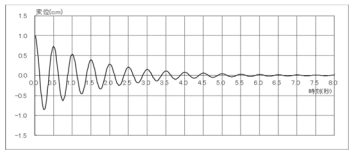


自由振動の一例(前回の演習より)

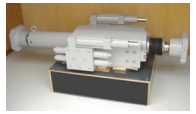
T_0=1(s)
h=0.1



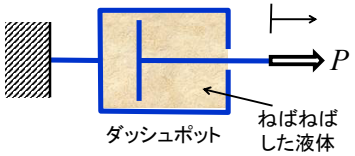
f_0=2(Hz)
h=0.05



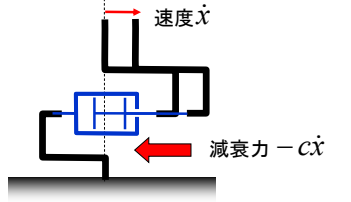
ダッシュポットと減衰力



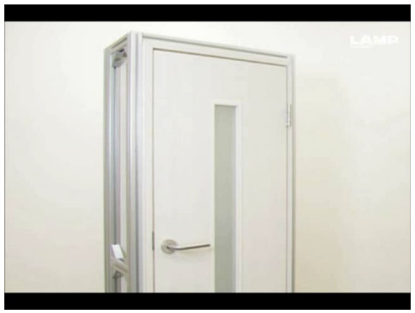
オイルダンパー



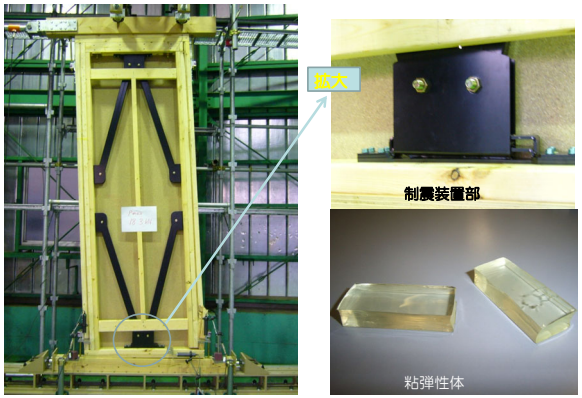
運動方程式への組み込み



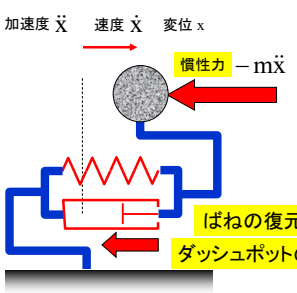
ドアのダンパー



粘弾性体を用いた木造建物の制震装置



減衰系の運動方程式



力の釣り合いより

$$-m\ddot{x}-c\dot{x}-kx=0$$

$$m\ddot{x}+c\dot{x}+kx=0$$

運動方程式

指数関数の性質

$e^{-h\omega_0 t}$　　e ;自然対数の底、ネイピア数 (2.718……)

$t=0 \Rightarrow e^{0}=1$　　$t=\infty \Rightarrow e^{-\infty}=0$

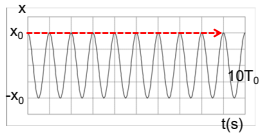
各種公式

$$\frac{d}{dt}e^{-h\omega_0 t}=-h\omega_0 e^{-h\omega_0 t}$$

$$\log_e e^{-h\omega_0 t}\left(=\ln e^{-h\omega_0 t}\right)=-h\omega_0 t$$

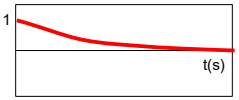
減衰系の自由振動

$x_0\cos\omega_0 t$



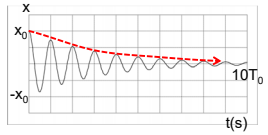
×

$e^{-h\omega_0 t}$

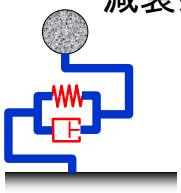


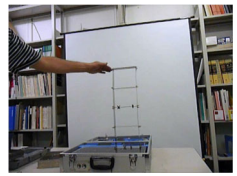
=

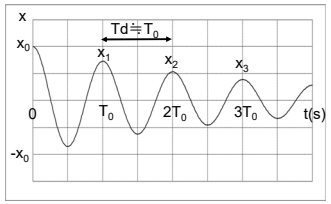
$e^{-h\omega_0 t}\cos\omega_0 t$



減衰系の自由振動







$$\frac{x_1}{x_0}=\frac{x_2}{x_1}=\frac{x_3}{x_2}=\cdots$$