# Content

[Content 0](#_Toc56147455)

[Horiz beam 2 diag wires 0](#_Toc56147456)

[Diag beam fless wall rgh floor 1](#_Toc56147457)

[Horiz beam rgh wall diag wire 2](#_Toc56147458)

[SHM spring frictionless floor 3](#_Toc56147459)

[SD for NCC 7](#_Toc56147460)

[Notes 8](#_Toc56147461)

[Version 8](#_Toc56147462)

# Horiz beam 2 diag wires

*x*

*y*

*z*



*m*, *L*

*T*2

*w* = *mg*

*l*1

*l*2

*O*

*A*

*B*

*C*

*D*

*E*

*T*1

*θ*1

*θ*2

*m*, *L*

*l*1

*l*2

*O*

*A*

*B*

*C*

*D*

*θ*1

*θ*2

*x*

*y*

*z*



*m*, *L*

*w* = *mg*

*l*1

*l*2

*O*

*A*

*B*

*C*

*D*

*E*

*T*1 cos *θ*1

*θ*1

*θ*2

*T*2 cos *θ*2

*T*2 sin *θ*2

*T*1 sin *θ*1

*l*1

*l*2

*O*

*B*

*D*

*T*2 sin *θ*2

*T*1 sin *θ*1

*w*

*l*1

*l*2

*O*

*B*

*D*

*T*2 sin *θ*2

*w*

*l*1

*l*2

*O*

*B*

*D*

*T*1 sin *θ*1

+

+

+

+

+

+

–

–

–

# Diag beam fless wall rgh floor

*x*

*y*

*z*



*m*, *L*

*μ* ≠ 0

*θ*

*μ* = 0

*w* = *mg*

*N*floor

*N*wall

*f*floor

*A*

*B*

*O*

*lw,A* = ½ *L* cos *θ*

*lN*floor*,A* = *L* cos *θ*

*lf*floor*,A* = *L* sin *θ*

*m*, *L*

*μ* ≠ 0

*μ* = 0

*A*

*B*

*O*

# Horiz beam rgh wall diag wire

*x*

*y*

*z*



*m*, *L*

*μ* ≠ 0

*θ*

*w* = *mg*

*TB*

*N*wall

*f*wall

*A*

*B*

*O*

½ *L*

*TB* sin *θ*

*TB* cos *θ*

*m*, *L*

*μ* ≠ 0

*θ*

*O*

½ *L*

*B*

*A*

# SHM spring frictionless floor



*μ* = 0

*k*

*m*

*F* = –*k*(*x* – *x*0)

*x* = *x*0

*x* = *x*0

*x* > *x*0

*x* >> *x*0

*x* > *x*0

*x* = *x*0

*v* > 0

*v* = 0

*v* < 0

*v* < 0

*x* < *x*0

*x* << *x*0

*x* < *x*0

*x* = *x*0

*v* < 0

*v* = 0

*v* > 0

*v* > 0

*t*  = 0

*t*  = *T* / 8

*t*  = *T* / 4

*t*  = 3*T* / 8

*t*  = *T* / 2

*t*  = *T* / 2

*t*  = 5*T* / 8

*t*  = 3*T* / 4

*t*  = 7*T* / 8

*t*  = *T*

*x*

*t*

0

*T* / 4

*T* / 2

*x*

*t*

*T* / 2

3*T* / 4

*T*

*t*

*x*

*A*

–*A*

*F* < 0

*F* << 0

*F* < 0

*F* = 0

*F* = 0

*F* = 0

*F* > 0

*F* >> 0

*F* > 0

*F* = 0

*v* > 0

*v* < 0

*x*

*y*

*z*

Simple harmonic motion: harmonic motion 🡪 the motion should obey sinusoidal function

, cos(…) 🡪 common case is a mass attached to a spring, it can horizontal motion or vertical motion.

x is displacement

A is amplitude (maximum displacement)

ω is angular frequency ω = 2πf

f is frequency f = 1 / T

T is period

*φ*0 is initial phase

Newton’s 2nd law for linear motion

. For now, for simplicity only, we choose that *x*0 = 0.



, , 



. 





 if x ≠ 0 then🡪 or .

, 

v(t)? 🡪  🡪 

a(t)? 🡪 🡪 

SHM (simple harmonic motion) case mass-spring system

   

Mechanical energy (conservation of energy)

Potential energy: elastic potential energy of a spring 

Kinetic energy: 

Total energy (mechanical energy): 





**Exercise 1**. Supose there is , where x in m, t in s.

1. Find A, ω, f, T, and ϕ0.
2. Find v(t) and a(t)
3. Find amplitude of v(t) and a(t)
4. 

A = 0.05 m,  rad, 🡪 rad/s

🡪 Hz,  s

1. 🡪 m/s

🡪 m/s2

1. 🡪 amplitude is simple put the sin / cos to 1 or maximum of x(t)

🡪 amplitude of velocity is 0.01 π m/s

🡪amplitude of acceleration is 0.002 π2 m/s2. (do not include – sign)

Parabolic motion (review only)





# SD for NCC

Man

Woman

Child

Port-driven GDP

Energy Occupation

Water Occupation

Waste Discharge

Urban GDP

+

Environmental Quality

Resources Loss

Health Risk

+

+

–

+

+

–

–

–

Green Technology

–

–

–

+

Trade

+

Port Demand

Port Pressure

+

+

+

Port Cargo Troughput

+

Port Investment

Shoreline Occupation

+

–

+

Port Cargo Troughput Capacity

+

+

–

Port Revenue

Port Profit

+

+

+

+

Population

Death

Birth

–

+

In-Migration

+

+

+

–

Life Quality

–

–

Intrastate Industry

Interstate Industry

Interstate Infrastructure

+

+

Intrastate Infrastructure

+

+

–

–

Investment

+

+

+

+

Carrying Capacity

+

# Notes

* 130% as for jekyll blog with MathJax
* Save as 0000x first then save as back to 0000, remove 0000x then, x = i

# Version

20201110, 201113