

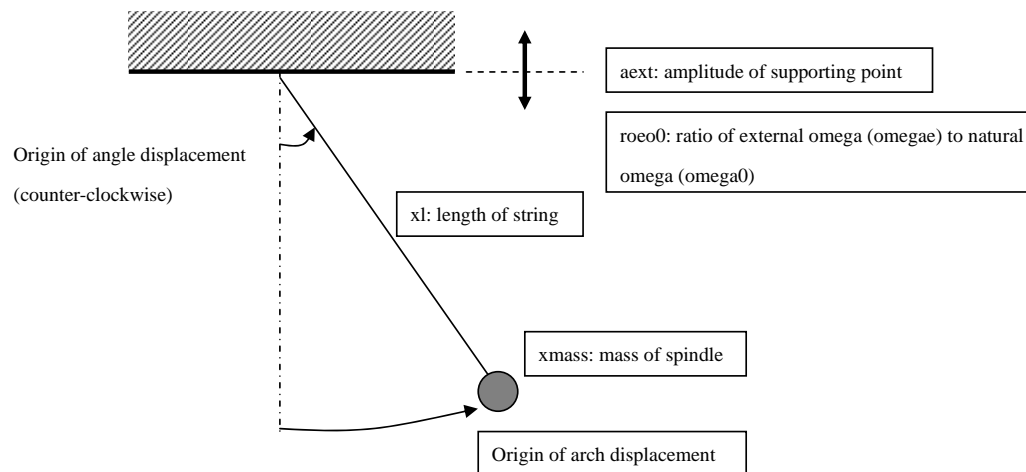
How to use 'Pendulum.for' : free pendulum and swing

Pendulum.for

Input file: Pendulum.idt

Output files:
Pendulum.thd

コメント [A1]: Time history of
displacement, vel., and acc.



Pendulum.idt

コメント [A2]: ファイル名は固定

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c
c   xl      : length of string
c   xmass   : mass of obejects winging
c   viscc   : coefficient of viscocity    -> viscosity force = -viscc*vel
c   theata0 : initial angle displacement
c   tinc    : time increment for calculation
c   nstep   : number of calculation steps
c   iprint  : skip number of output
c           : results will be output at step = (j-1)*iprint    j=1, nstep
c   deltan  : delta in Newmark's beta method
c   betan   : beta in Newmark's beta method
c   aext    : amplitude of supporting point
c   roeo0   : ratio omegae / omega0

```

```

/parameter/
10.0
5.0
0.0
30.0
0.001
100000
1
0.5
0.5
0.5
2.0

```

Note:

1. To hold stability condition for numerical analysis by Newmark's method
If $\text{betan} < 0.25$ tinc must be smaller than $2.0 / (\text{dsqrt}(1.0 - 4.0 * \text{betan}) * \text{dsqrt}(\text{grav} / \text{xl}))$
2. $\omega_0 = 2\pi / T_N$, ω_{gae} : angle frequency of vibration of supporting point with amplitude aext

$$T_N = 2\pi \sqrt{\frac{xl}{g}}$$

$\text{roeo0} = \omega_{\text{gae}} / \omega_0$ 2 is best: refer to note in lecture.

3. if theata0 is small and viscc is zero, the period of pendulum analyzed must be coincident with T_N .
4. if aext is set to be zero, it is free swing.

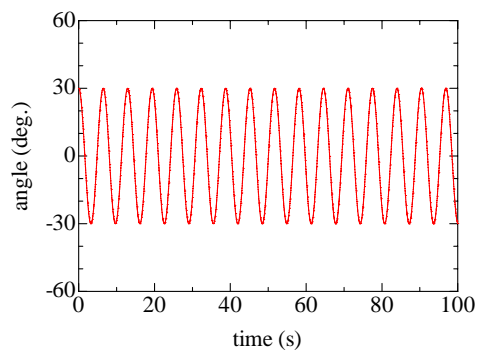
'thd' files: Pendulum.thd

istep, time, disp, theata, vel, acc

0	0.000000E+00,	0.5235988E+01,	0.3000000E+02,	0.0000000E+00,
-0.4900000E+01				
1	0.1000000E-02,	0.5235985E+01,	0.2999998E+02,	-0.5155674E-02,
-0.5411348E+01				
2	0.2000000E-02,	0.5235977E+01,	0.2999994E+02,	-0.1082265E-01,
-0.5922608E+01				

コメント [A3]: Step number,
duration time, displacement
from x1*theata0 which is arch
displacement, angle
displacement, velocity and acc..

aext=0: free vibration of pendulum



aext=0.5: forced vibration of pendulum (roeo0=2.0)

