```
% FEMLAB Model M-file
% Generated by FEMLAB 3.0a (FEMLAB 3.0.0.228, $Date: 2004/04/05 18:04:31 $)
% Some geometry objects are stored in a separate file.
% The name of this file is given by the variable 'flbinaryfile'.
%                                                  programmed by 木　澤
clc
clear all

flclear fem

% Femlab version
clear vrsn
vrsn.name = 'FEMLAB 3.0';
vrsn.ext = 'a';
vrsn.major = 0;
vrsn.build = 228;
vrsn.rcs = '$Name:  $';
vrsn.date = '$Date: 2004/04/05 18:04:31 $';
fem.version = vrsn;

flbinaryfile='plate_reidai3_1.flm';

% Constants
fem.const={'disturb','1'};

% Geometry
clear draw
g2=flbinary('g2','draw',flbinaryfile);
draw.p.objs = {g2};
draw.p.name = {'PT1'};
draw.p.tags = {'g2'};
g1=flbinary('g1','draw',flbinaryfile);
draw.s.objs = {g1};
draw.s.name = {'R1'};
draw.s.tags = {'g1'};
fem.draw = draw;
fem.geom = geomcsg(fem);

% Initialize mesh
fem.mesh=meshinit(fem);

% (Default values are not included)

% Application mode 1
clear appl
appl.mode.class = 'SmeMindlin';
appl.assignsuffix = '_drm';
clear prop
prop.analysis='eigen';
appl.prop = prop;
clear pnt
pnt.Fz = {0,'-disturb'};
pnt.ind = [1,1,2,1,1];
appl.pnt = pnt;
clear bnd
bnd.constrlocaltype = {'free','fixed'};
bnd.ind = [2,1,1,1];
appl.bnd = bnd;
clear equ
equ.E = 2.06e11;
equ.rho = 7870;
equ.nu = 0.3;
equ.thickness = 0.006;
equ.ind = [1];
appl.equ = equ;
fem.appl{1} = appl;

% Multiphysics
fem=multiphysics(fem);

% Extend mesh
fem.xmesh=meshextend(fem);
```

```
% Solve problem
fem.sol=femeig(fem, ...
               'solcomp',{'thx','w','thn_drm','thy'}, ...
               'outcomp',{'thx','w','thn_drm','thy'});

% Save current fem structure for restart purposes
fem0=fem;

% Plot solution
figure(1)
postplot(fem, ...
         'tridata',{'w','cont','internal'}, ...
         'triz','w', ...
         'trimap','jet(1024)', ...
         'deformsub',{'thx','thy'}, ...
         'lindata',{'w','cont','internal'}, ...
         'linmap','jet(1024)', ...
         'deformbnd',{'thx','thy'}, ...
         'solnum',1, ...
         'title','eigfreq_drm(1)=87.918871    Surface: z-displacement   Height: z-displacement   Boundar ↙
y: z-displacement   Displacement: Rotation', ...
         'refine',3, ...
         'axisequal','off', ...
         'grid','on');

%//////////////////////////以下修正部分//////////////////////////////

%---Export state-space ----
system0=femstate(fem, ...
         'reduction','on', ...              %低次元化  ON
         'redstatic','on', ...
         'redmode',18, ...                  %低次元化の次数 18次という意味ではない
         'uscale','none',.....              %自動スケーリングをOFF
         'output',{{3,'w'}}, ...            %point 3のz変位がoutput   Ver.2.3と表現が異なる
         'input',{'disturb'});              %point 3入力  input (See  Femlab )

MMM=system0.M ;              %慣性項の抽出
KKK=-system0.MA ;            %剛性項の抽出
BBB=system0.MB ;             %Matrix Bを抽出(入力位置に関連)
CCC=system0.C ;              %Matrix Cを抽出(出力位置に関連)
DDD=system0.D  ;             %Matrix Dを抽出

forcegain=1.0e3;
wb=500;
w=logspace(0, 5, wb);   %(2, 6, wb);

%//////////////////////////////////////////////////////////////////////////
%                    No Dumpping SYSTEM  (この状態では減衰がありません)
%        Transfer to modal coordinates          (モード座標系に変換)---- %
%        M x=MA x+ MB u
%          y=C x + D u
%        When  x=T q
%        M Tq^ = MA Tq + MB u
%        multiplied by T'on left-hand side
%        T' M Tq^=T' MA T q + T' MB u
%               y=C  T q + D u
%        then   T' M T = I
%               T' MA T = diag(w^2)
%//////////////////////////////////////////////////////////////////////////
[size_n size_n]=size(MMM);
Eval=inv(MMM)*KKK;                  % MMM and KKK are global variables from smestate_new.m
[vec,val]=eig(Eval);                % modal matorix 固有値:vec,固有ベクトル:val
omega=diag(sqrt(val));              %固有振動数
[omega,jv]=sort(omega);             %固有振動数の並び替え
Tr=zeros(size_n, size_n);
for jj=1:size_n
     Tr(:,jj)=vec(:,jv(jj));
end

nmlz=sqrt(Tr'*MMM*Tr);
for jj=1:size_n
     Tr(:,jj)=vec(:,jv(jj))/nmlz(jj,jj);          %正規化modal matrix
end
```

```
Tr'*MMM*Tr;                                          %UNIT MATRIX

%----------No Dumpping SYSTEM  (この状態では減衰がありません)----------
%---------Coordinates conversion
Ap=[zeros(19,19)   eye(19,19)
     -Tr'*KKK*Tr    zeros(19,19) ];

B1p=[zeros(19,1)
      Tr'*BBB(:,1) * forcegain ];

Cp=[ CCC*Tr    zeros(1,19)];
Dp=[DDD(:,1)];

sys1=ss(Ap,B1p,Cp,Dp);
[mag1_ ,phase1_ ]=bode(sys1,w);
for i=1:wb
     mag1(i,1)=mag1_(1,1,i);
     phase1(i,1)=phase1_(1,1,i);
end


figure(2)
plot(w/(2*pi),20*log10(mag1));
axis([0 5000 -140 0])
xlabel('Frequency[Hz]')
ylabel('Compliance[dB]')
title('Compliance Transfer ')
grid on

%%%%%%%%%%%%%%%%%%%%%%%%%     Dumpping SYSTEM  %%%%%%%%%%%%%%%%%%%%%%%%%%%
%          レイリー減衰  D=a M + b K
%
%          App=[ 0             eye
%                diag(w^2)    diag(2 tu w^2)   ]
%---------Coordinates conversion
size(Ap);
App=[zeros(19,19)       eye(19,19)
     -Tr'*KKK*Tr        1.0e-7*( -Tr'*KKK*Tr - Tr'*MMM*Tr ) ];

B1pp=[zeros(19,1)
      Tr'*BBB(:,1) * forcegain];

Cpp=[ CCC*Tr  zeros(1,19)];
Dpp=[0];

sys2=ss(App,B1pp,Cpp,Dpp);
[mag2_ ,phase2_ ]=bode(sys2,w);
for i=1:wb
     mag2(i,1)=mag2_(1,1,i);
     phase2(i,1)=phase2_(1,1,i);
end


figure(3)
plot(w/(2*pi),20*log10(mag2));
axis([0 5000 -140 0])
xlabel('Frequency[Hz]')
ylabel('Compliance[dB]')
title('Compliance Transfer ')
grid on
```