Computer Implementation 1.15 *(Matlab)* *Complete solution of a plane stress problem (p. 58)*

By combining procedures discussed in earlier implementations, here we present a complete *Matlab* based solution for the plane stress bracket model. This implementation can be used as template to analyze any other plane stress analysis problem.

MatlabFiles\Chap1\PlaneStressBracketEx.m

```
% Plane stress analysis of bracket
e = 10^4; nu = 0.2; h=0.25; q=-20;
nodes=[0,0; 0,2; 2,0; 2,3/2; 4,0; 4,1];
conn = [1,3,4; 4,2,1; 3,5,6; 6,4,3];
lmm = [1,2,5,6,7,8; 7,8,3,4,1,2;
    5,6,9,10,11,12; 11,12,7,8,5,6];

K=zeros(12); R = zeros(12,1);
% Generate equations for each element and assemble them.
for i=1:4
    con = conn(i,:);
    lm = lmm(i,:);
    k = PlaneStressTriElement(e, nu, h, nodes(con,:));
    K(lm, lm) = K(lm, lm) + k;
end
% Define the nodal load vector
con = conn(2,:);
lm = lmm(2,:);
rq = PlaneStressTriLoad(1,q,0,h,nodes(con,:));
R(lm) = R(lm) + rq;

con = conn(4,:);
lm = lmm(4,:);
rq = PlaneStressTriLoad(1,q,0,h,nodes(con,:));
R(lm) = R(lm) + rq;

% Nodal solution and reactions
[d, reactions] = NodalSoln(K, R, [1,2,3,4], zeros(4,1))
for i=1:4
    fprintf(1,'Results for element %3.0g \n',i)
    EffectiveStress=PlaneStressTriResults(e, nu, ...
        nodes(conn(i,:),:), d(lmm(i,:)))
end


>> PlaneStressBracketEx

d =

            0
            0
            0
            0
    -0.010355
     -0.02553
    0.0047277
    -0.024736
    -0.013139
    -0.055493
   8.389e-005
```

```
    -0.055566


reactions =

        21.25
       4.1065
       -16.25
       15.894

Results for element   1

eps =

   -0.0051776
   0.00052936
   -0.0027096


sig =

      -52.831
      -5.2726
       -11.29


PrincipalStresses =

      -55.375
      -2.7286


EffectiveStress =

       54.062

Results for element   2

eps =

    0.0023638
            0
    -0.012368


sig =

       24.623
       4.9246
      -51.533


PrincipalStresses =

      -37.691
       67.239
```

```
EffectiveStress =

       92.066

Results for element   3

eps =

   -0.0013921
 -7.3267e-005
   -0.0017584


sig =

      -14.653
      -3.6633
      -7.3267


PrincipalStresses =

      -18.317
 -2.7978e-014


EffectiveStress =

       18.317

Results for element   4

eps =

   0.00019194
   0.00052936
   -0.0052277


sig =

       3.1022
       5.9141
      -21.782


PrincipalStresses =

      -17.319
       26.336


EffectiveStress =

       38.074
```