Computer Implementation 1.14 *(Matlab)* *Plane stress element results (p. 58)*

The solution for each element for a plane stress problem can easily be generated by writing a simple function in *Matlab*. The following *PlaneStressTriResults* function returns strain and stress components, principal stresses, and equivalent von Mises stress for each element.

MatlabFiles\Chap1\PlaneStressTriResults.m

```
function se = PlaneStressTriResults(e, nu, coord, dn)
% se = PlaneStressTriResults(e, nu, coord, dn)
% Computes element solution for a plane stress triangular element
% coord = nodal coordinates
% e = modulus of elasticity
% nu = Poisson's ratio
% dn = nodal displacements
% Following are the output variables are at element center
% {strains, stresses, principal stresses, effective stress}
x1=coord(1,1); y1=coord(1,2);
x2=coord(2,1); y2=coord(2,2);
x3=coord(3,1); y3=coord(3,2);
x=(x1+x2+x3)/3; y=(y1+y2+y3)/3;
b1 = y2 - y3; b2 = y3 - y1; b3 = y1 - y2;
c1 = x3 - x2; c2 = x1 - x3; c3 = x2 - x1;
f1 = x2*y3 - x3*y2; f2 = x3*y1 - x1*y3; f3 = x1*y2 - x2*y1;
A = (f1 + f2 + f3)/2;
C = e/(1 - nu^2)*[1, nu, 0; nu, 1, 0; 0, 0, (1 - nu)/2];
B = [b1, 0, c1; 0, c1, b1; b2, 0, c2; 0, c2, b2;
    b3, 0, c3; 0,c3, b3]/(2*A);
eps = B'*dn
sig = C*eps
sx = sig(1); sy= sig(2); sxy=sig(3);
PrincipalStresses = eig([sx,sxy; sxy,sy])
se = sqrt((sx - sy)^2 + sy^2 + sx^2 + 6*sxy^2)/sqrt(2);
```