

Input File

This file generates the input for the main function and saves them in the .mat input file.

```
n_e = 16          % total number of elements
```

```
n_e = 16
```

```
n = sqrt(n_e);  
p_e = 4          % nodes per area element
```

```
p_e = 4
```

```
p_b = 2          % nodes per boundary element
```

```
p_b = 2
```

```
n_n = (n+1)^2    % total number of nodes
```

```
n_n = 25
```

```
n_b = 2*n        % boundary nodes on C1
```

```
n_b = 8
```

```
C = zeros(n^2,p_e);    % Connectivity Matrix  
C_b_4 = zeros(8,2);    % Boundary Connectivity (n = 16)  
C_b_8 = zeros(16,2);   % Boundary Connectivity (n = 64)  
Bu_4 = zeros(7,3);     % Essential BC (n=16)  
Bu_8 = zeros(15,3);    % Essential BC (n=64)
```

```
for i = 1:n  
    for j = 1:n  
        C(j + (i-1)*n,1) = j + (i-1)*(n+1);  
        C(j + (i-1)*n,2) = j + (i-1)*(n+1) + 1;  
        C(j + (i-1)*n,3) = j + (i-1)*(n+1) + n+2;  
        C(j + (i-1)*n,4) = j + (i-1)*(n+1) + n+1;
```

```
    end
```

```
end
```

```
C
```

```
C = 16×4
```

```
    1     2     7     6  
    2     3     8     7  
    3     4     9     8  
    4     5    10     9  
    6     7    12    11  
    7     8    13    12  
    8     9    14    13  
    9    10    15    14  
   11    12    17    16  
   12    13    18    17  
    ⋮  
    ⋮
```

```
C_b_4 = [11 6;  
        6 1;  
        1 2;  
        2 3;  
        3 4;  
        4 5;  
        5 10;  
        10 15];
```

```
C_b_8 = [37 28;  
        28 19;  
        19 10;  
        10 1;  
        1 2;  
        2 3;  
        3 4;  
        4 5;  
        5 6;  
        6 7;  
        7 8;  
        8 9;  
        9 18;  
        18 27;  
        27 36;  
        36 45];
```

```
Bu_4 = [16 0 0;  
        21 0 0;  
        22 0 0;  
        23 0 0;  
        24 0 0;  
        25 0 0;  
        20 0 0;];
```

```
Bu_8 = [46 0 0;  
        55 0 0;  
        64 0 0;  
        73 0 0;  
        74 0 0;  
        75 0 0;  
        76 0 0;  
        77 0 0;  
        78 0 0;  
        79 0 0;  
        80 0 0;  
        81 0 0;  
        72 0 0;  
        63 0 0;  
        54 0 0;];
```

```
Bu = Bu_4
```

```
Bu = 7×3
    16     0     0
    21     0     0
    22     0     0
    23     0     0
    24     0     0
    25     0     0
    20     0     0
```

```
C_b = C_b_4
```

```
C_b = 8×2
    11     6
     6     1
     1     2
     2     3
     3     4
     4     5
     5    10
    10    15
```

```
le = 2/n           % lenght of element
```

```
le = 0.5000
```

```
lb = 2/n           % lenght of boundary element
```

```
lb = 0.5000
```

```
X = zeros(n_n,2);    % Global coordinate vector
```

```
for i = 1:n_n

    f = floor(i/(n+1.1));
    r = rem(i,n+1);

    if (r==0)
        r = n+1;
    end

    X(i,2) = f*(2/n);
    X(i,1) = (r-1)*(2/n);

end
X
```

```
X = 25×2
     0     0
 0.5000     0
 1.0000     0
 1.5000     0
 2.0000     0
     0  0.5000
 0.5000  0.5000
```

```

1.0000    0.5000
1.5000    0.5000
2.0000    0.5000
⋮

```

```

t_star_x = 500;
t_star_y = t_star_x^2;

t_star = [t_star_x;t_star_y]    % tranction vector

```

```

t_star = 2×1
        500
       250000

```

```

E = 2.1e11; % Young's Modulus in Pa
v = 0.3;    % Poisson's Ratio

S = (E/((1+v)*(1-2*v)))*[1-v v 0;v 1-v 0; 0 0 (1-2*v)/2] % S is the material
stiffness matrix from constitutive law

```

```

S = 3×3
1011 ×
    2.8269    1.2115         0
    1.2115    2.8269         0
         0         0    0.8077

```

```

save("input_file1.mat");

```