Finite Element method

Number of elements = 6
Density of Shaft = 7800
Element-1

Mass Matrix [M]1
0.000103 0.000052
0.000052 0.000103

Stiffness matrix [K]1
12723.45 -12723.45
-12723.45 12723.45

Element-2

Mass Matrix [M]2
0.000103 0.000052
0.000052 0.000103

Stiffness matrix [K]2
12723.45 -12723.45
-12723.45 12723.45

Element-3

Mass Matrix [M]3
0.000103 0.000052
0.000052 0.020103

Stiffness matrix [K]3
12723.45 -12723.45
-12723.45 12723.45

Element-4

Mass Matrix [M]4
0.000103 0.000052
0.000052 0.000103

Stiffness matrix [K]4
12723.45 -12723.45
-12723.45 12723.45

Element-5

Mass Matrix [M]5
0.000103 0.000052
0.000052 0.000103

Stiffness matrix [K]5
12723.45 -12723.45
-12723.45 12723.45

Element-6

Mass Matrix [M]6
0.000103 0.000052
0.000052 0.000103

Stiffness matrix [K]6
12723.45 -12723.45
-12723.45 12723.45

Global Mass matrix
0.000103 0.000052 0.000000 0.000000 0.000000
0.000000 0.000000
0.000052 0.000207 0.000052 0.000000 0.000000
0.000000 0.000000
0.000000 0.000052 0.000207 0.000052 0.000000
0.000000 0.000000
0.000000 0.000000 0.000052 0.020207 0.000052
0.000000 0.000000
0.000000 0.000000 0.000000 0.000052 0.000207
0.000052 0.000000
0.000000 0.000000 0.000000 0.000000 0.000052
0.000207 0.000052
0.000000 0.000000 0.000000 0.000000 0.000000
0.000052 0.000103

Global Stiffness matrix
1.27e+04 -1.27e+04 0.00e+00 0.00e+00 0.00e+00
0.00e+00 0.00e+00
-1.27e+04 2.54e+04 -1.27e+04 0.00e+00 0.00e+00
0.00e+00 0.00e+00
0.00e+00 -1.27e+04 2.54e+04 -1.27e+04 0.00e+00
0.00e+00 0.00e+00
0.00e+00 0.00e+00 -1.27e+04 2.54e+04 -1.27e+04
0.00e+00 0.00e+00
0.00e+00 0.00e+00 0.00e+00 -1.27e+04 2.54e+04
-1.27e+04 0.00e+00
0.00e+00 0.00e+00 0.00e+00 0.00e+00 -1.27e+04

```
2.54e+04        -1.27e+04
0.00e+00        0.00e+00        0.00e+00        0.00e+00        0.00e+00
-1.27e+04       1.27e+04

Fixed-Fixed Boundary condition

Natural frequencies:
641.321
7016.464
7081.134
15689.291
15716.229

Eigen vector matrix
-0.4987 0.5000  -0.2314 -0.5038 -0.5000
0.5013  -0.5000 -0.4604 -0.4961 -0.5000
-0.0051 -0.0000 -0.6848 0.0154  0.0000
0.5013  0.5000  -0.4604 -0.4961 0.5000
-0.4987 -0.5000 -0.2314 -0.5038 0.5000

Normalised eigen vector matrix
-0.3378 -1.0000 -1.0000 1.0000  -0.9949
-0.6723 -1.0000 -0.9846 -1.0000 1.0000
-1.0000 0.0000  0.0305  -0.0000 -0.0103
-0.6723 1.0000  -0.9846 1.0000  1.0000
-0.3378 1.0000  -1.0000 -1.0000 -0.9949
```