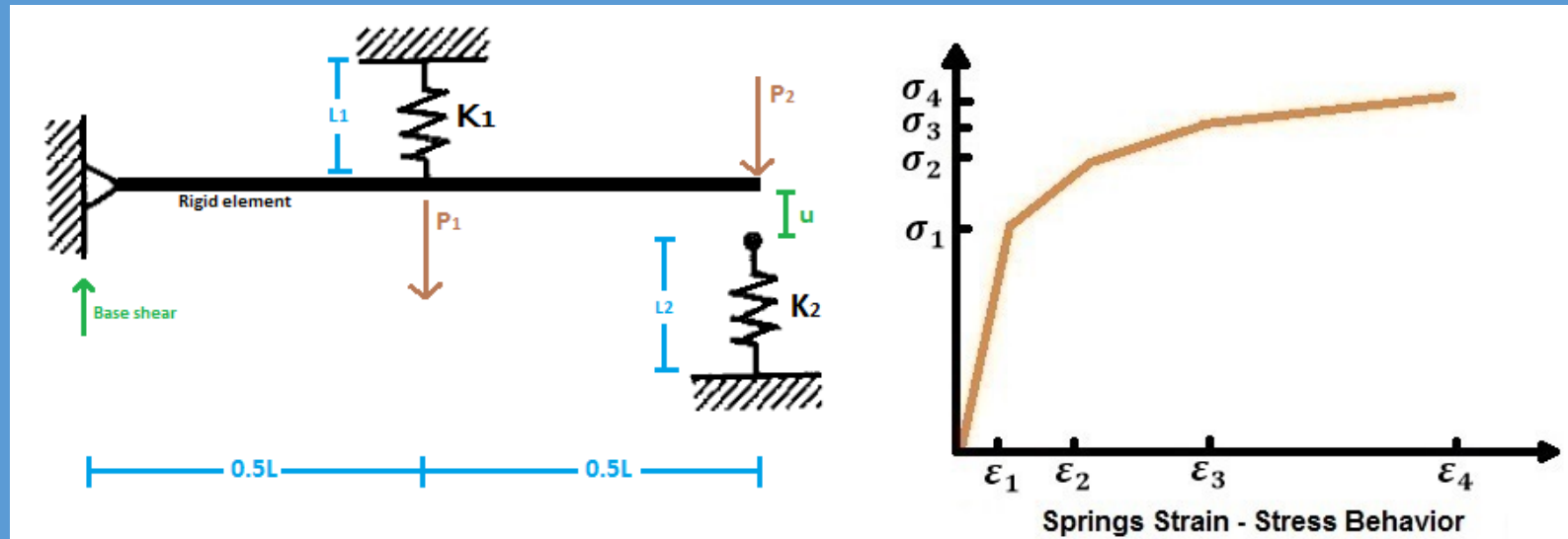#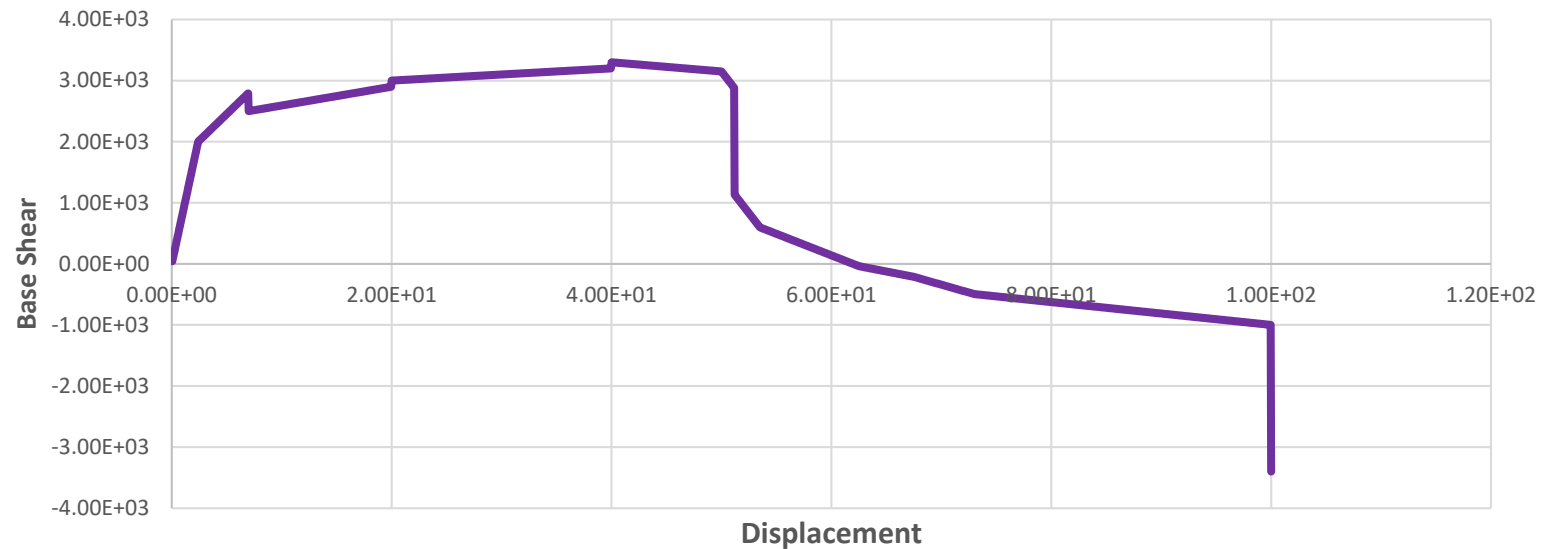 Geometric Nonlinearity Analysis of Springs with Rigid Element Displacement Control Large Deformation Formulated in C programming
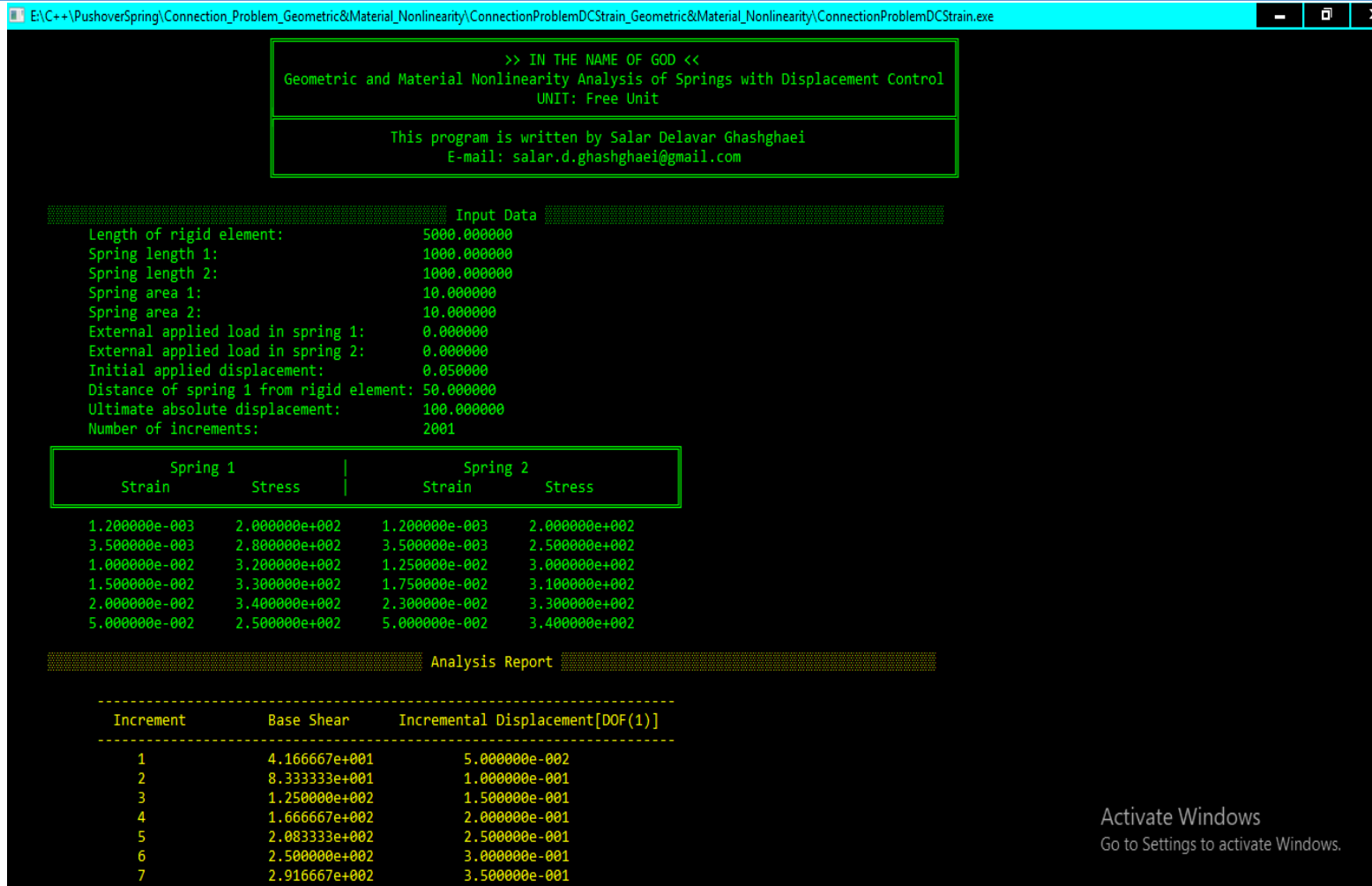

Springs Strain - Stress Behavior
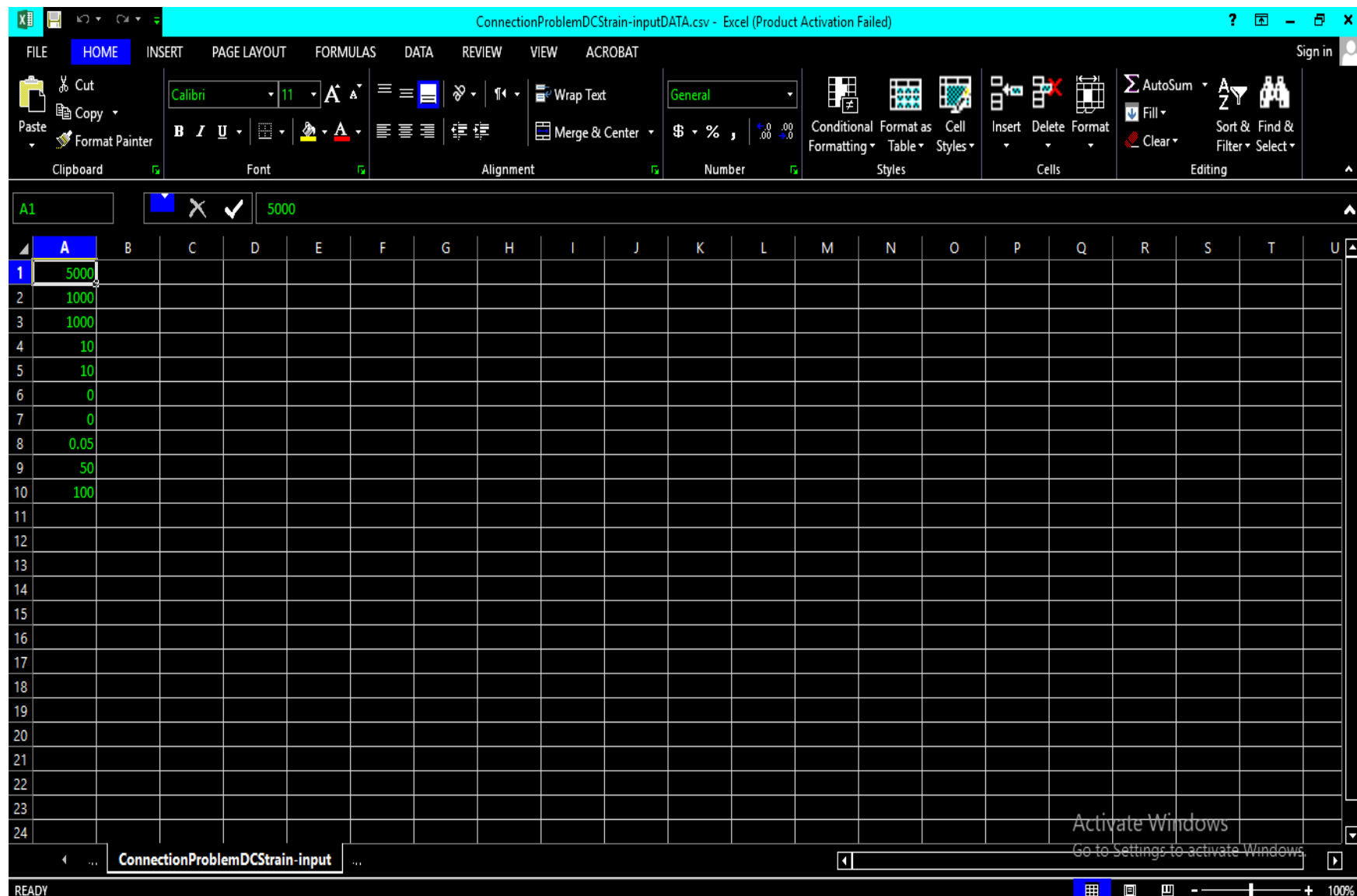
Geometric and Material Nonlinearity Analysis of Springs

C program is written by Salar Delavar Ghashghaei – Publication Date: 18/November/2019

E-mail: salar.d.ghashghaei@gmail.com

Plot :

```
                        >> IN THE NAME OF GOD <<
        Geometric and Material Nonlinearity Analysis of Springs with Displacement Control
                              UNIT: Free Unit

               This program is written by Salar Delavar Ghashghaei
                      E-mail: salar.d.ghashghaei@gmail.com


================================ Input Data ================================
    Length of rigid element:              5000.000000
    Spring length 1:                      1000.000000
    Spring length 2:                      1000.000000
    Spring area 1:                        10.000000
    Spring area 2:                        10.000000
    External applied load in spring 1:    0.000000
    External applied load in spring 2:    0.000000
    Initial applied displacement:         0.050000
    Distance of spring 1 from rigid element: 50.000000
    Ultimate absolute displacement:       100.000000
    Number of increments:                 2001

          Spring 1          |          Spring 2
       Strain      Stress    |       Strain      Stress

    1.200000e-003  2.000000e+002  1.200000e-003  2.000000e+002
    3.500000e-003  2.800000e+002  3.500000e-003  2.500000e+002
    1.000000e-002  3.200000e+002  1.250000e-002  3.000000e+002
    1.500000e-002  3.300000e+002  1.750000e-002  3.100000e+002
    2.000000e-002  3.400000e+002  2.300000e-002  3.300000e+002
    5.000000e-002  2.500000e+002  5.000000e-002  3.400000e+002

============================== Analysis Report ==============================


    ---------------------------------------------------------------
    Increment       Base Shear      Incremental Displacement[DOF(1)]
    ---------------------------------------------------------------
        1           4.166667e+001        5.000000e-002
        2           8.333333e+001        1.000000e-001
        3           1.250000e+002        1.500000e-001
        4           1.666667e+002        2.000000e-001
        5           2.083333e+002        2.500000e-001
        6           2.500000e+002        3.000000e-001
        7           2.916667e+002        3.500000e-001
```

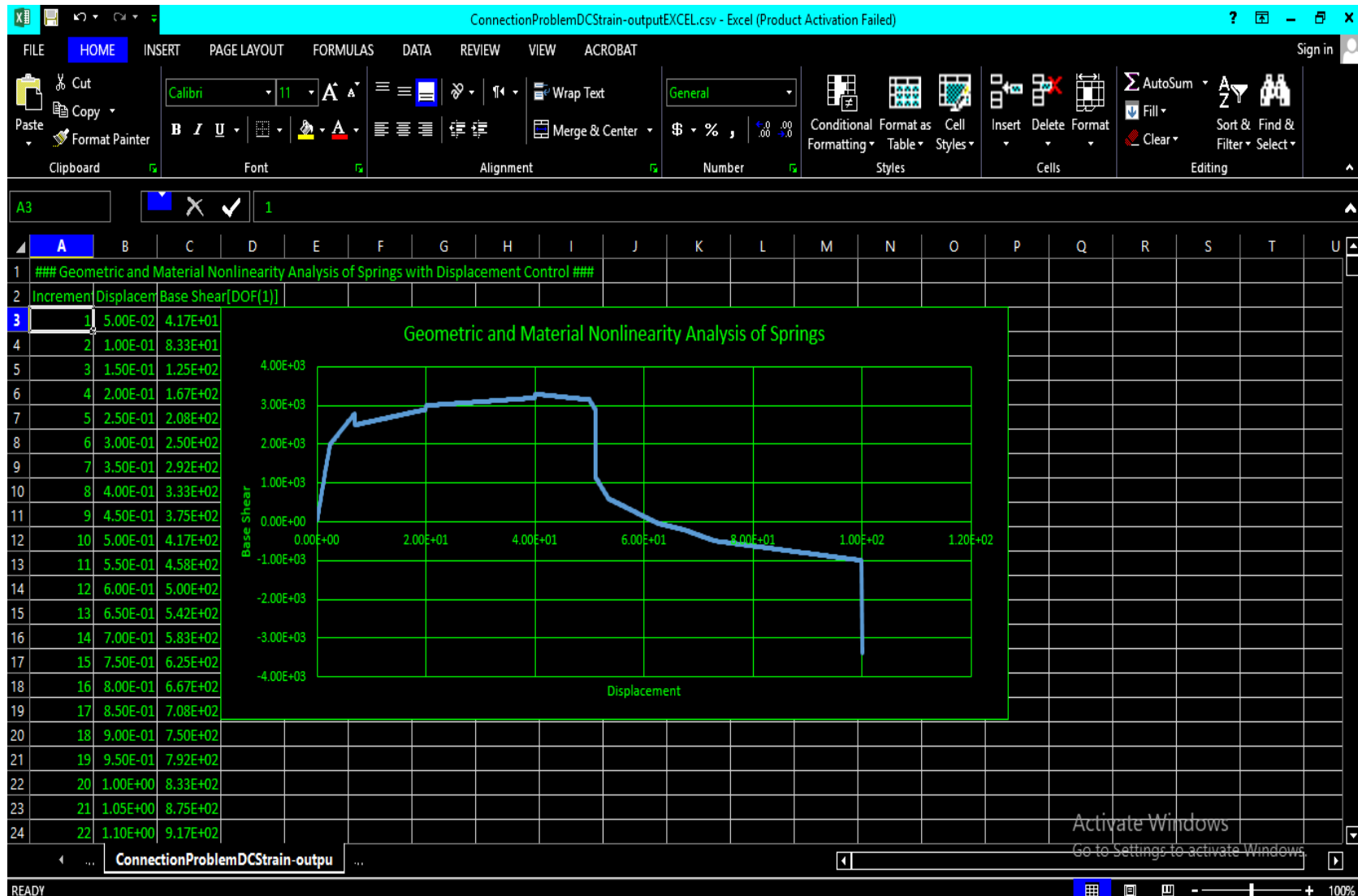**Figure(1)** Analysis file

Figure(2) Input csv file
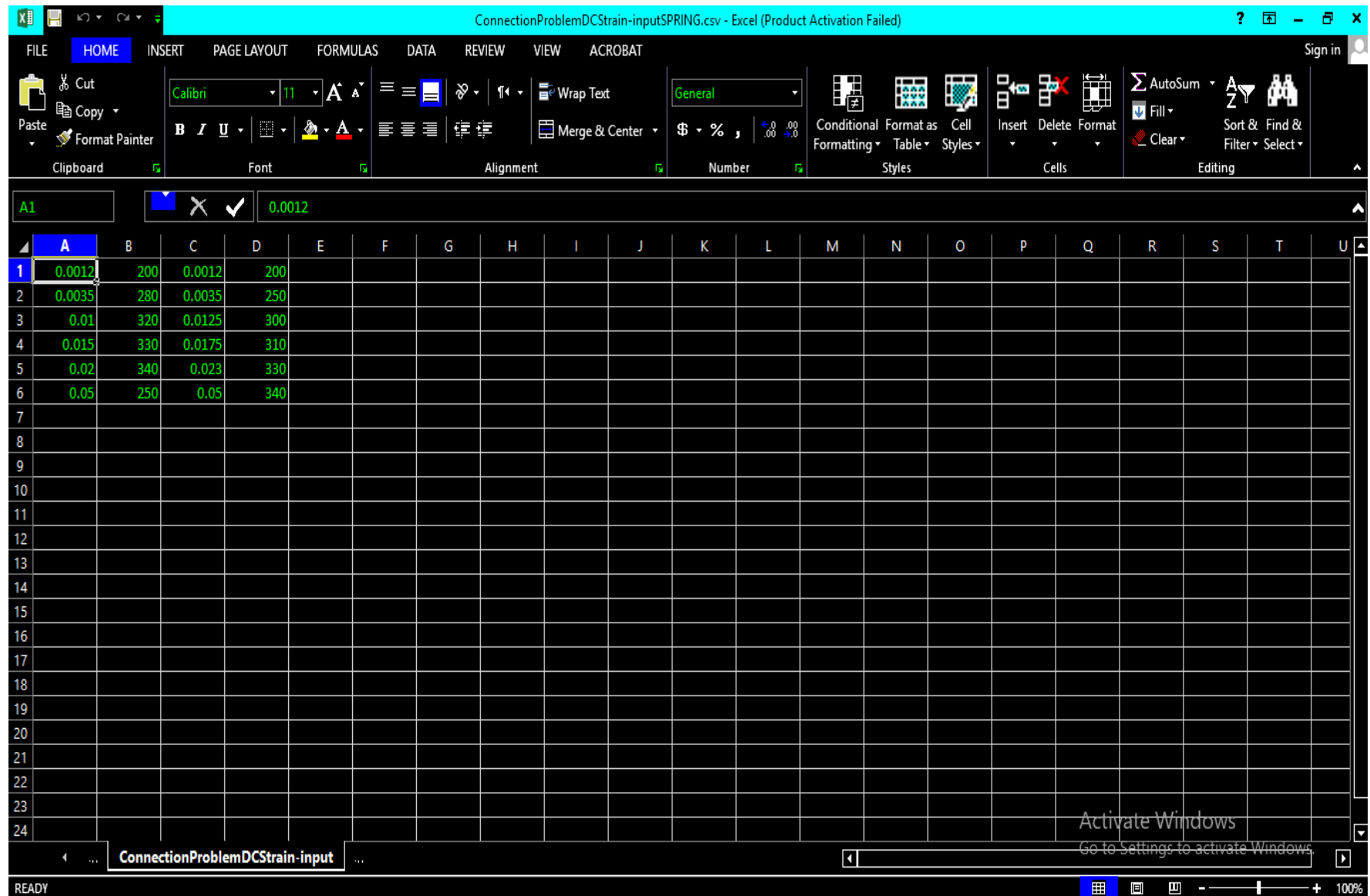
Figure(3) Input Strain-Stress properties csv file

	A	B	C
1	### Geometric and Material Nonlinearity Analysis of Springs with Displacement Control ###		
2	Increment	Displacement	Base Shear[DOF(1)]
3	1	5.00E-02	4.17E+01
4	2	1.00E-01	8.33E+01
5	3	1.50E-01	1.25E+02
6	4	2.00E-01	1.67E+02
7	5	2.50E-01	2.08E+02
8	6	3.00E-01	2.50E+02
9	7	3.50E-01	2.92E+02
10	8	4.00E-01	3.33E+02
11	9	4.50E-01	3.75E+02
12	10	5.00E-01	4.17E+02
13	11	5.50E-01	4.58E+02
14	12	6.00E-01	5.00E+02
15	13	6.50E-01	5.42E+02
16	14	7.00E-01	5.83E+02
17	15	7.50E-01	6.25E+02
18	16	8.00E-01	6.67E+02
19	17	8.50E-01	7.08E+02
20	18	9.00E-01	7.50E+02
21	19	9.50E-01	7.92E+02
22	20	1.00E+00	8.33E+02
23	21	1.05E+00	8.75E+02
24	22	1.10E+00	9.17E+02

Geometric and Material Nonlinearity Analysis of Springs

Figure(4) Output csv file