CalculiX Simulation

For

Linear spring subjected to concentrated load

Version 1.0

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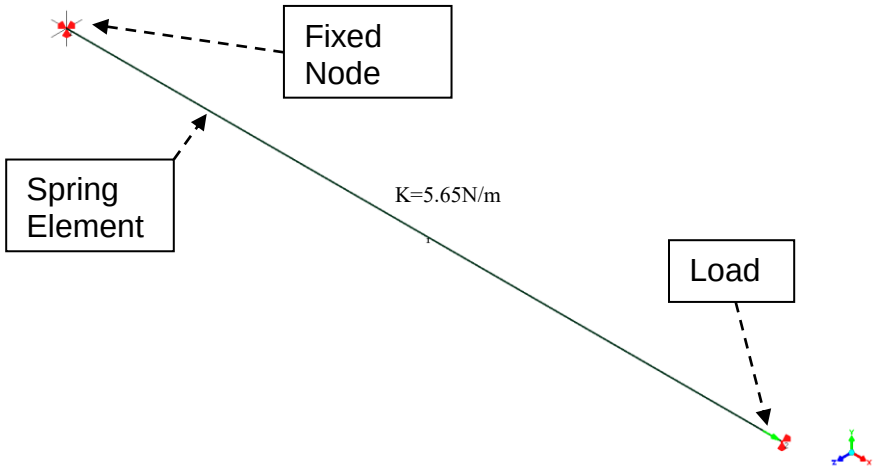
Revision history

Version Number	Comments
1.0	Original Publication

1. Project Description

The project deals with a simple linear spring that is subjected to concentrated load as shown below. This simple problem does not need FE, but it's a good starting point to learn the syntax of the finite element solver file and how to start using the software.



2. Hand Calculation

To calculate the displacement of Node #2 due to a concentrated load of 2.25N, we can use

$$F_{node} = K_{spring} x_{node}$$

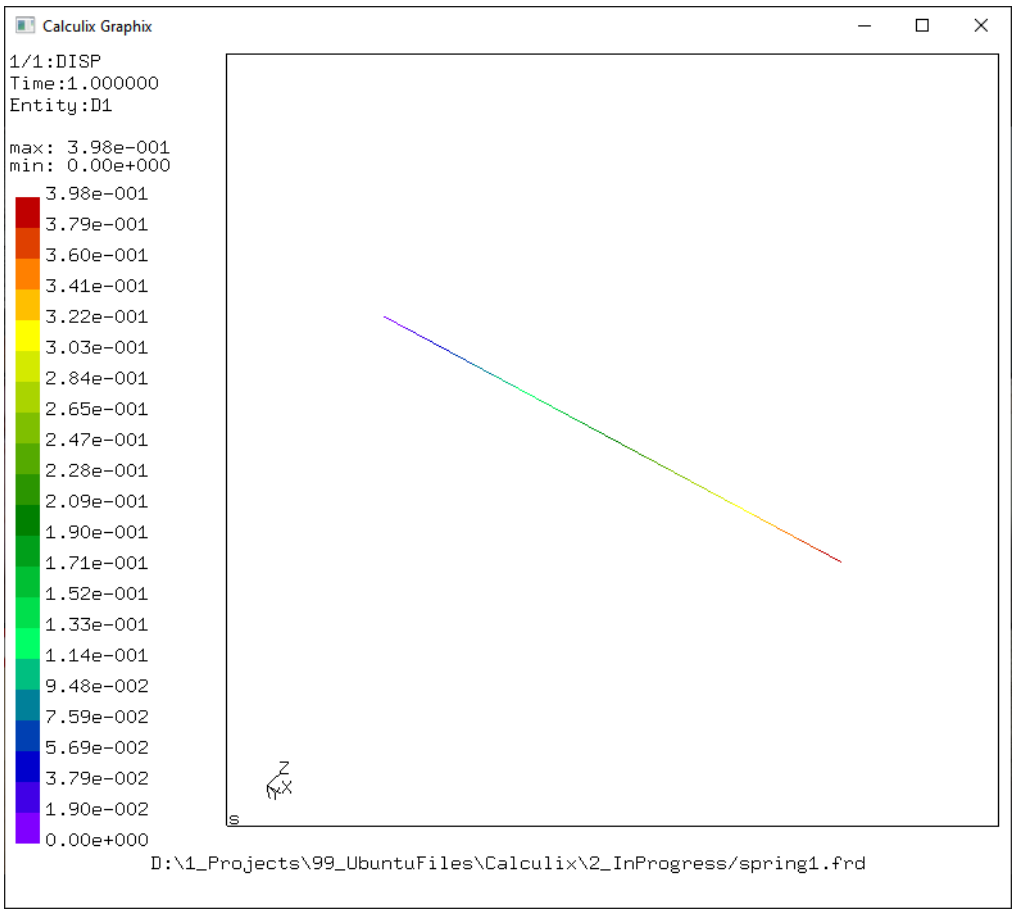
$$F_{node} := 2.25\ \text{N} \qquad K_{spring} := 5.65\ \frac{\text{N}}{\text{m}}$$

$$x_{node} := \frac{F_{node}}{K_{spring}} = 0.3982\ \text{m}$$

The predicted displacement at Node #2 = 0.3982m

3. Results

The displacement plot looks like



The results are also printed in the dat file as

```
displacements (vx,vy,vz) for set NALL and time  0.1000000E+01

         1  0.000000E+00  0.000000E+00  0.000000E+00
         2  3.982301E-01  0.000000E+00  0.000000E+00
```

Thus, our hand calculation and FE results match.

4. Appendix – Input file

```
** Linear Spring subjected to a Concentrated Load
** Node Definition
** ---------------
*NODE,NSET=NALL
1,0.,0.,0.
2,1.,0.,0.
** Element Definition
** ------------------
*ELEMENT,TYPE=SPRINGA,ELSET=EALL
1,1,2
** Applying boundary conditions
** ----------------------------
*BOUNDARY
1,1,3
2,2,3
** Spring stiffness
** ----------------
*SPRING,ELSET=EALL
5.65
** Create Step
** -----------
*STEP,NLGEOM
*STATIC
** Apply Load
** ----------
*CLOAD
2,1,2.25
** Request Outputs
** ---------------
*NODE PRINT,NSET=NALL
U
*NODE FILE
U
*EL FILE
S
*END STEP
```