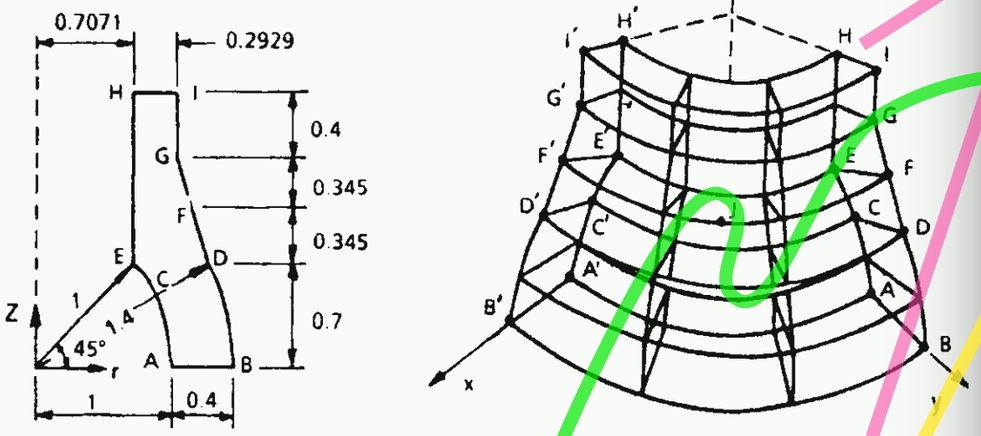
NAFEMS	SOLID CYLINDER / TAPER / SPHERE - TEMPERATURE	Test No LE11	DATE / ISSUE 15 - 6 - 90/2

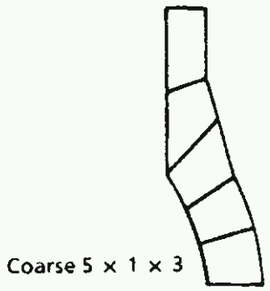
ORIGIN	NAFEMS report LSB2
ANALYSIS TYPE	Linear elastic solid

GEOMETRY Units M, KN

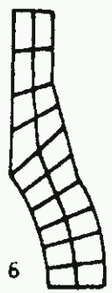


LOADING	Linear temperature gradient in the radial and axial direction $T\,°C = (x^2 + y^2)^{1/2} + z$
BOUNDARY CONDITIONS	Symmetry on xz-plane i.e. zero y-displacement Symmetry on yz-plane i.e. zero x-displacement Face on xy-plane zero z-displacement Face HIH'I' zero z-displacement
MATERIAL PROPERTIES	Isotropic, $E = 210 \times 10^3$ MPa, $\nu = 0.3$ $\alpha = 2.3 \times 10^{-4}$ / °C
ELEMENT TYPES	Solid hexahedra, wedges and tetrahedra

MESHES



Coarse 5 × 1 × 3



Fine 10 × 2 × 6

OUTPUT Direct stress σ_{zz} at point A	TARGET -105 MPa (refined axisymmetric)

doc : vim — Konsole

```
PROBLEM mechanical
READ_MESH $0.msh

# linear temperature gradient in the radial and axial direction
T(x,y,z) = (x^2 + y^2)^(1/2) + z

# Boundary conditions
BC xz      symmetry
BC yz      symmetry
BC xy      w=0
BC HIH'I'  w=0

# material properties (isotropic & uniform so we can use scalar constants)
E = 210e3*1e6        # mesh is in meters, so E=210e3 MPa -> Pa
nu = 0.3             # dimensionless
alpha = 2.3e-4       # in 1/ºC as in the problem

SOLVE_PROBLEM
WRITE_RESULTS FORMAT vtk
PRINT "sigma_z(A) =" sigmaz(0,1,0)/1e6 "MPa (target was -105 MPa)" SEP " "
~
"nafems-le11.fee" 20L, 561B                                   1,1           All
```

doc : bash — Konsole

```
gtheler@tom:~/codigos/feenox/doc$ feenox nafems-le11.fee
sigma_z(A) = -105.041 MPa (target was -105 MPa)
gtheler@tom:~/codigos/feenox/doc$
```