Curved Isoparametric Shell Element of Quadrilateral Shape (QUAD 8) is shown in Fig. 1

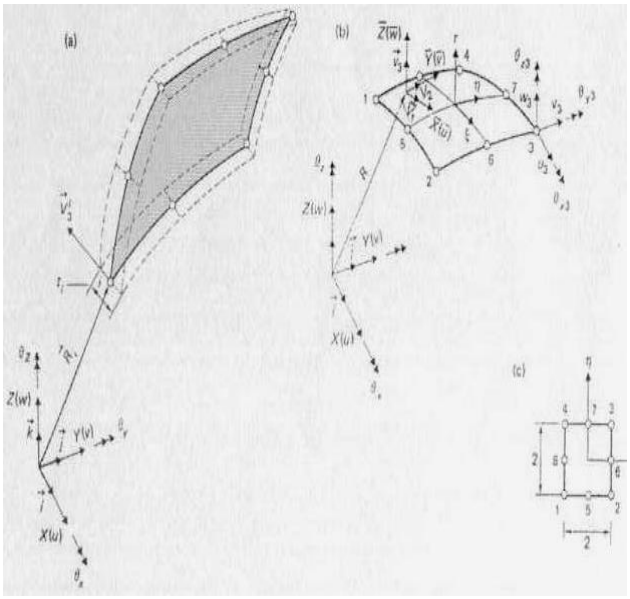


Fig. 1 Curved Isoparametric Shell Element of Quadrilateral Shape

Curved Isoparametric Shell Element of Triangular Shape (TRIA 6) is shown in Fig. 2

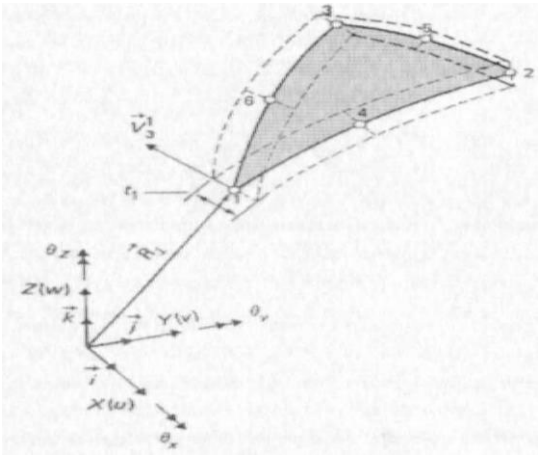


Fig. 2 Curved Isoparametric Shell Element of Triangular Shape

Typical meshes

The typical FE model for the analysis is shown below. (Fig. 3 and Fig. 4)

Total number of Elements =1200

Total number of Nodes = 3805

.

An isotropic cylindrical shell of radius R and thickness ‘t’ with transverse elliptical cutout subjected to uniform axial tension loading as shown in fig. 5.

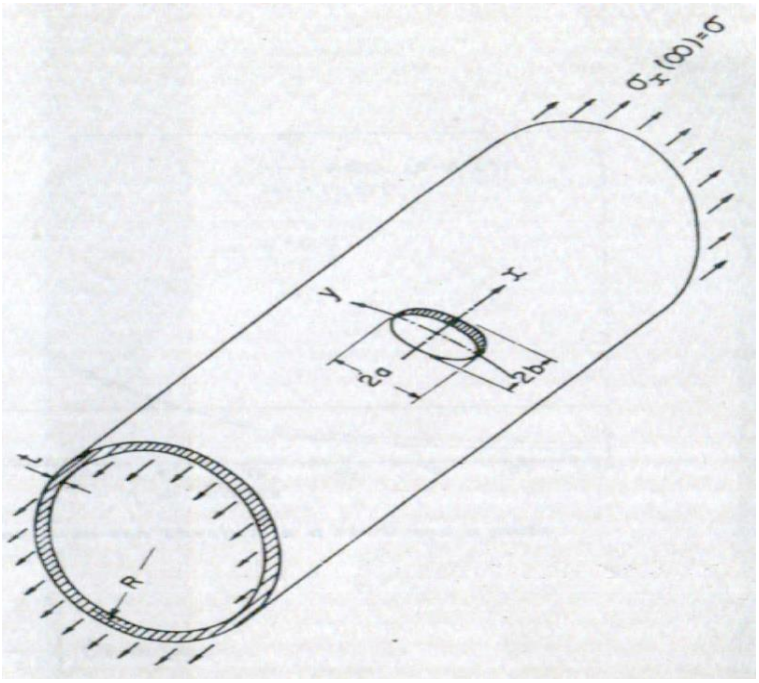


Fig. 5 Cylindrical shell under axial tension

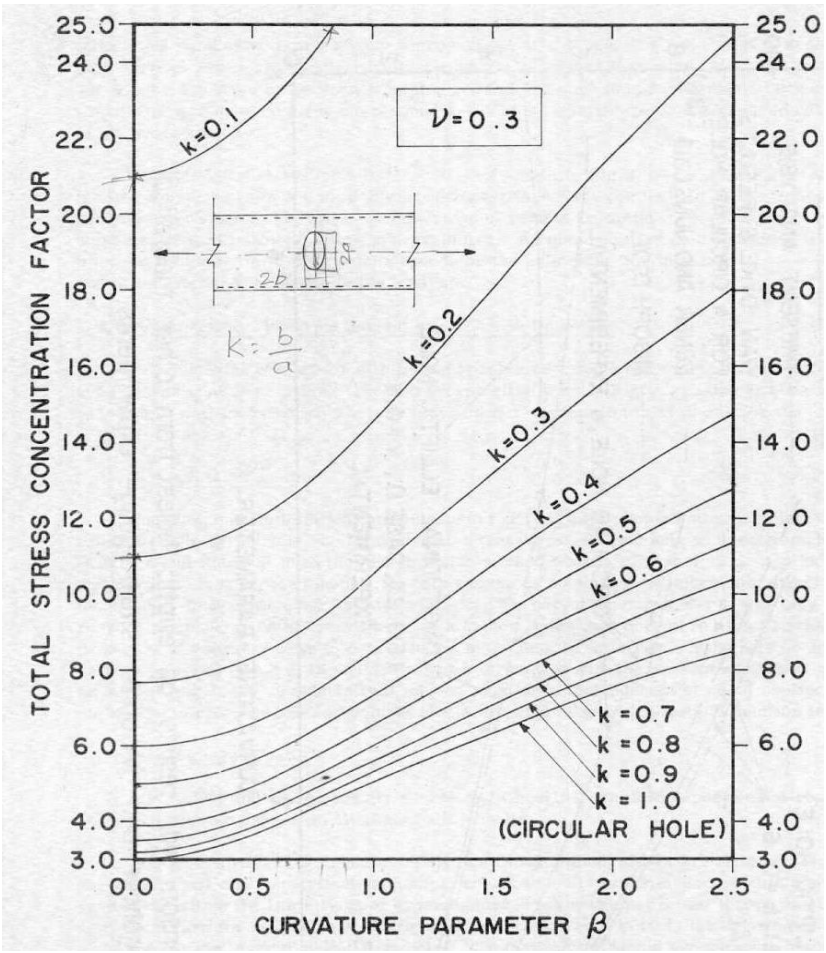


Fig. 6 Target solution[4]

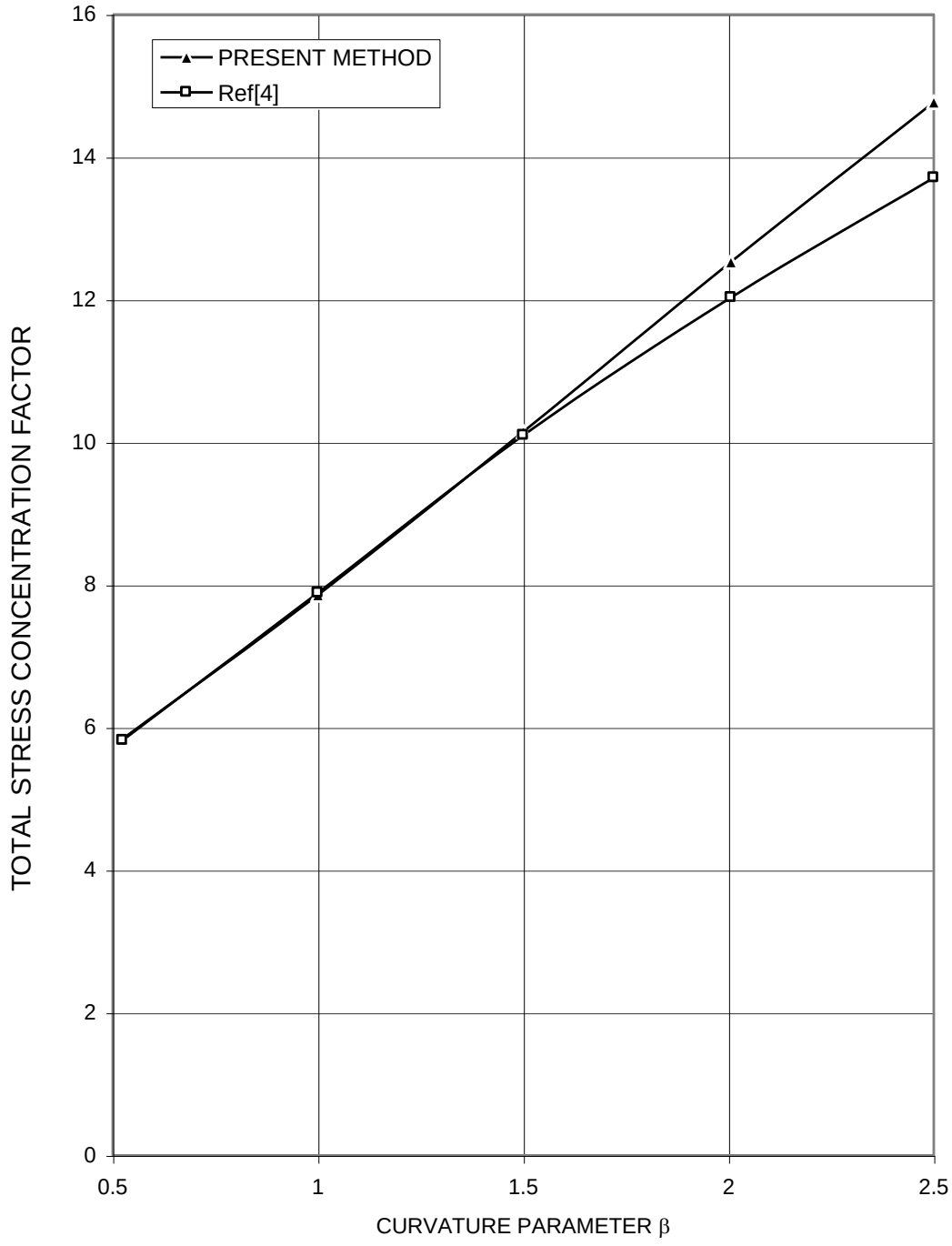


Fig. 7 Range of validity

Fig. 7 shows clear picture of the range of validity of the target solution plotted against β.

a)

b)

Fig. 8 Observed behavior for the case of β = 2.0

a) Stress contours

b) Displacement contours

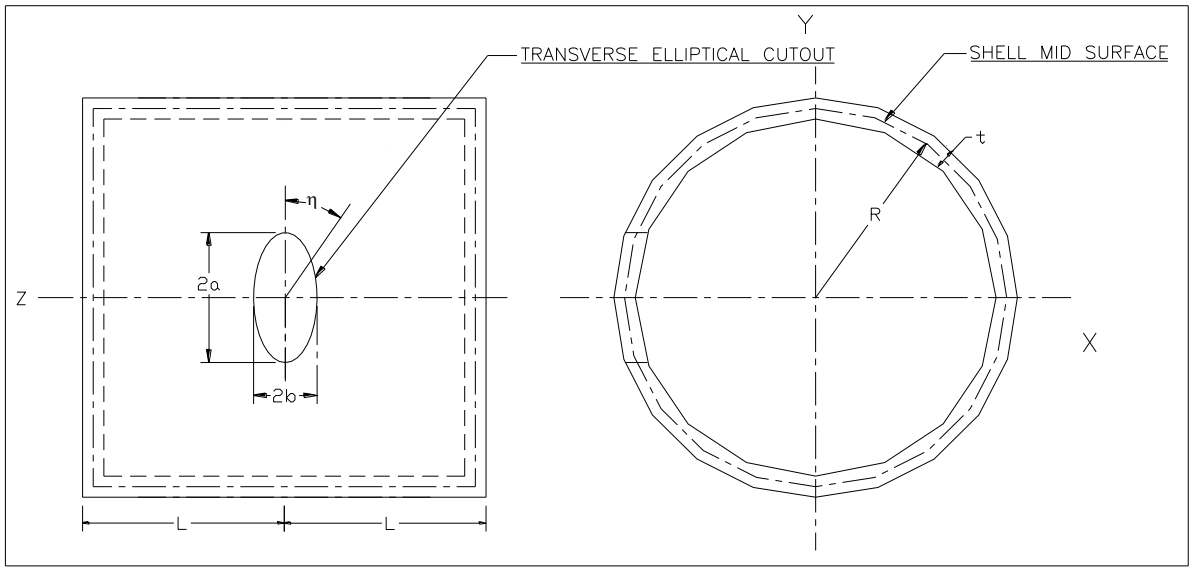
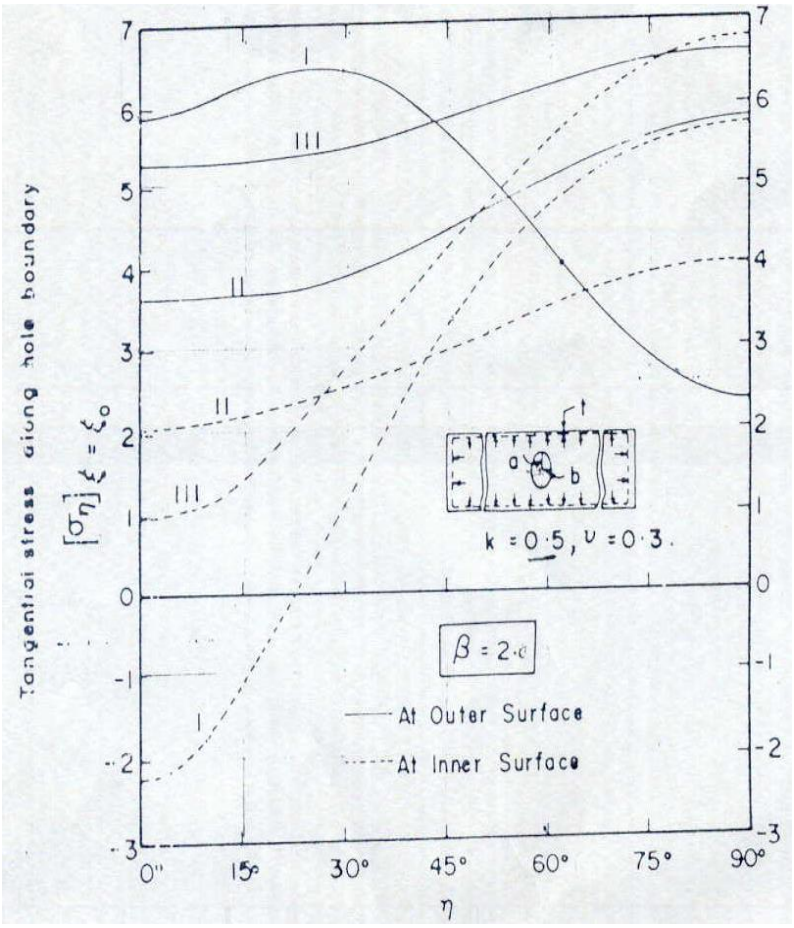


Fig. 9 Pressurized cylindrical shell



Influence of various assumptions regarding Kirchhoff shear distribution along the hole boundary for a pressurized cylinder with an elliptical cutout.

I. **Uniform Kirchhoff shear;**

II. **Mansfeld's idealization of transverse shear;**

III. **Kirchhoff shear distribution as in a clamped flat elliptic plate under uniform normal distributed load**

Fig. 10 Target solution[6]

Fig. 11 shows clear picture of the range of validity of the target solution.

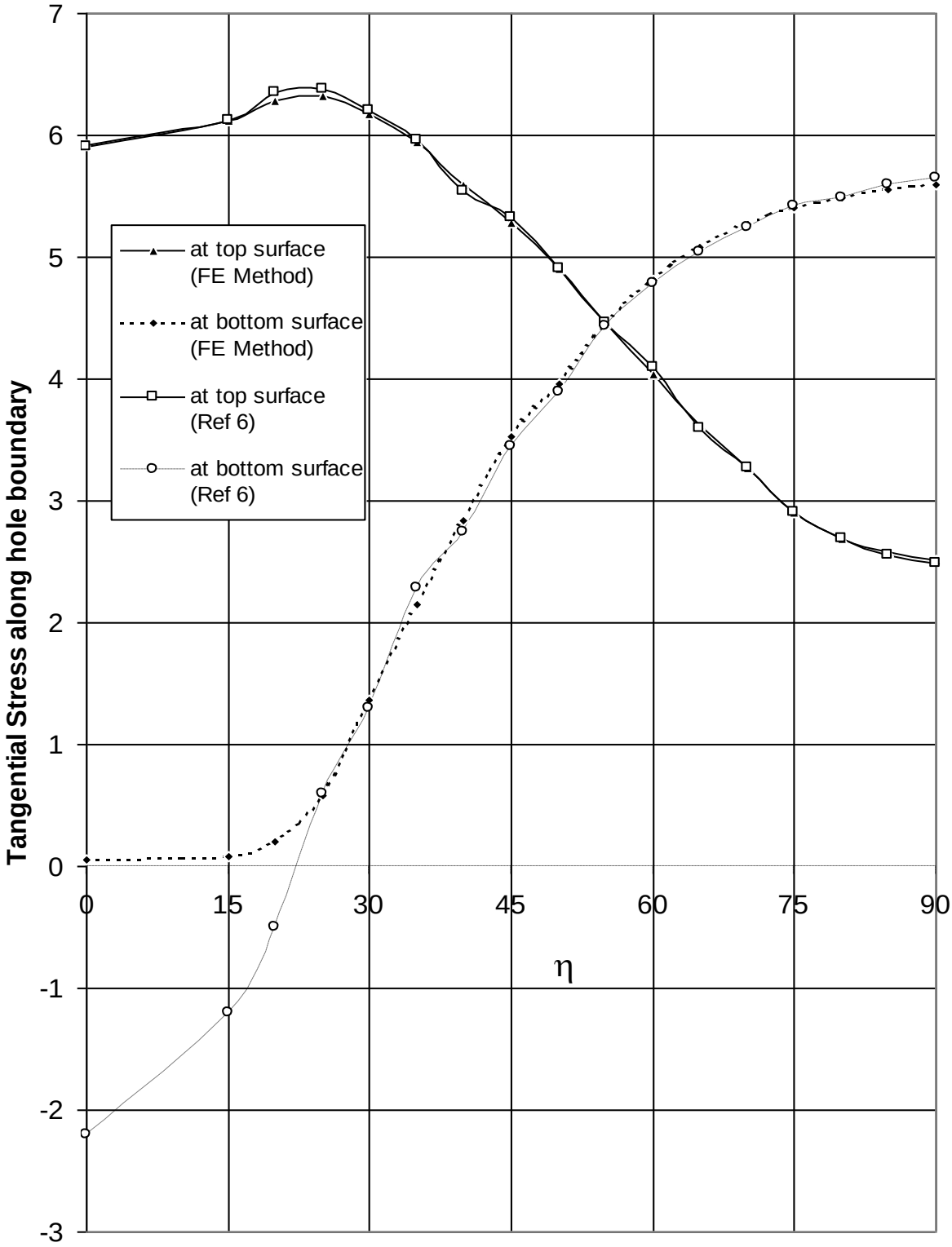


Fig. 11 Range of validity for β=2.0

Fig. 12 Observed behavior for β=2.0

a) Tangential Stress Distribution along Hole Boundary

b) Deformed Cylindrical Shell

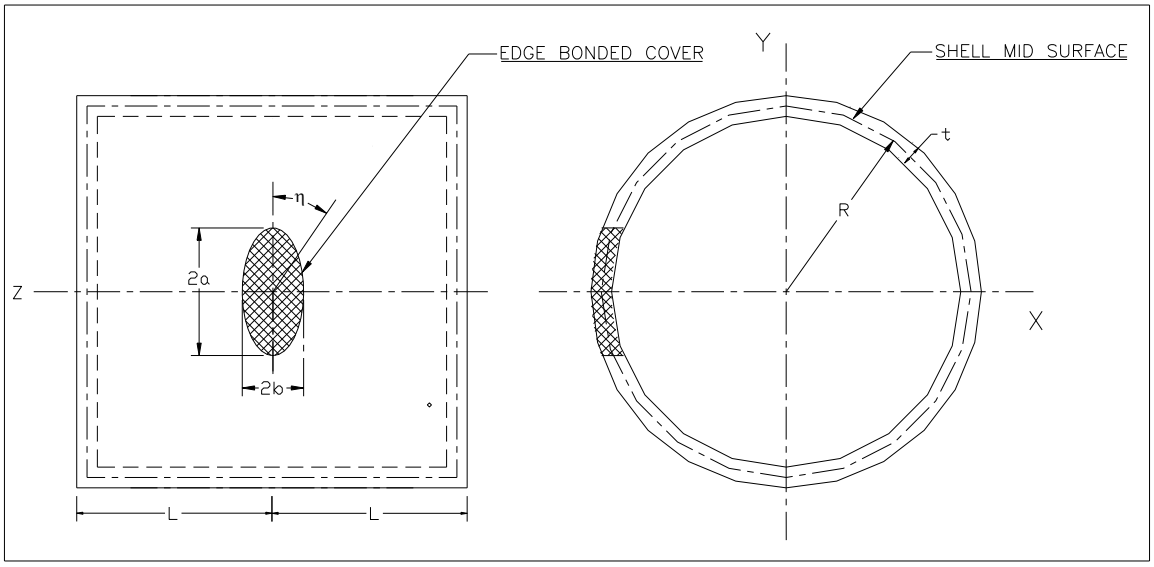


Fig. 13 Circular cylindrical shell with elliptic inclusion

Fig.14 SCF along hole boundary in a shell with high modulus elliptic inclusion (Top surface)

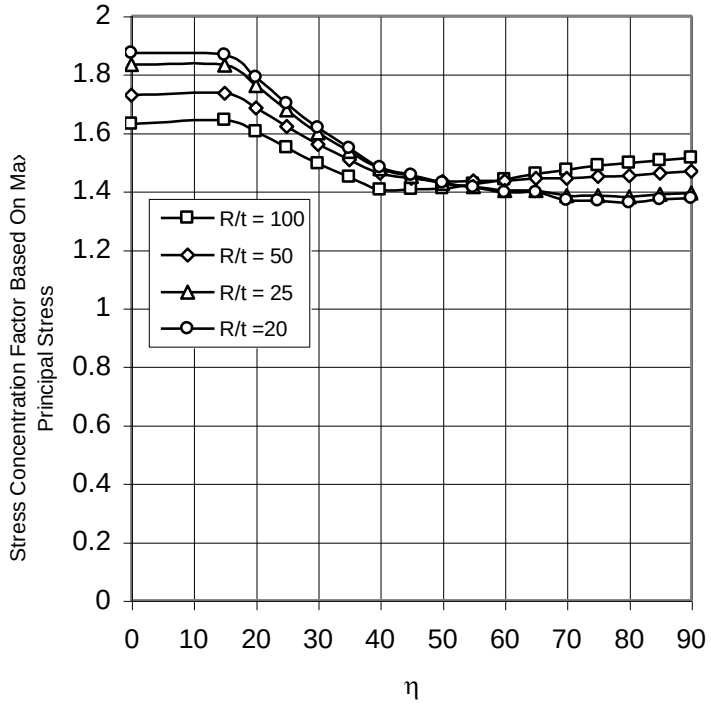


Fig.15 SCF along hole boundary in a shell with high modulus elliptic inclusion (Bottom surface)

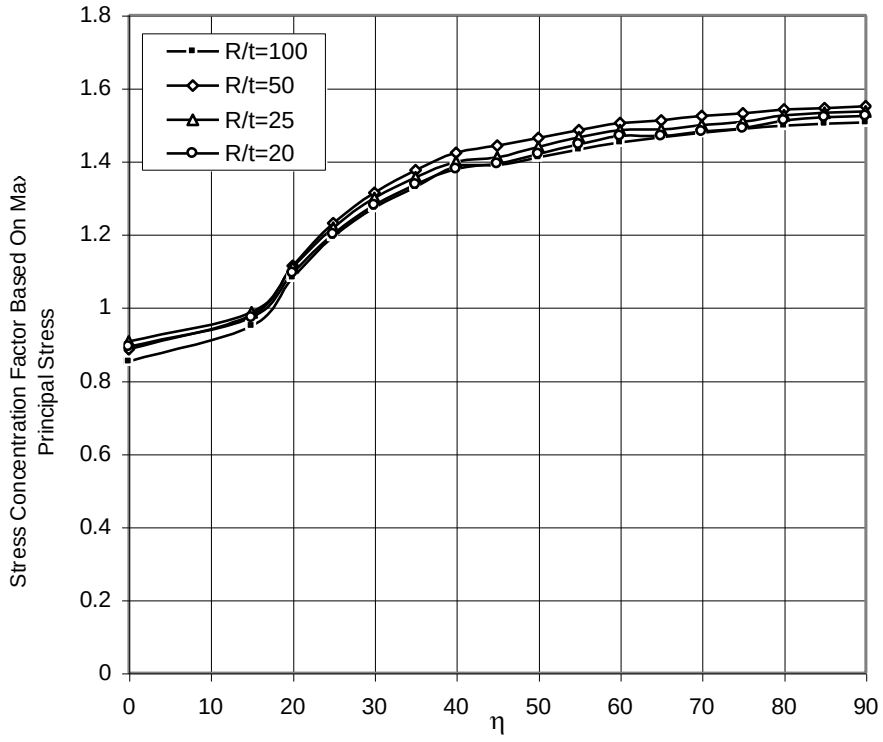


Fig.16 SCF along hole boundary in a shell with low modulus elliptic inclusion (Top surface)

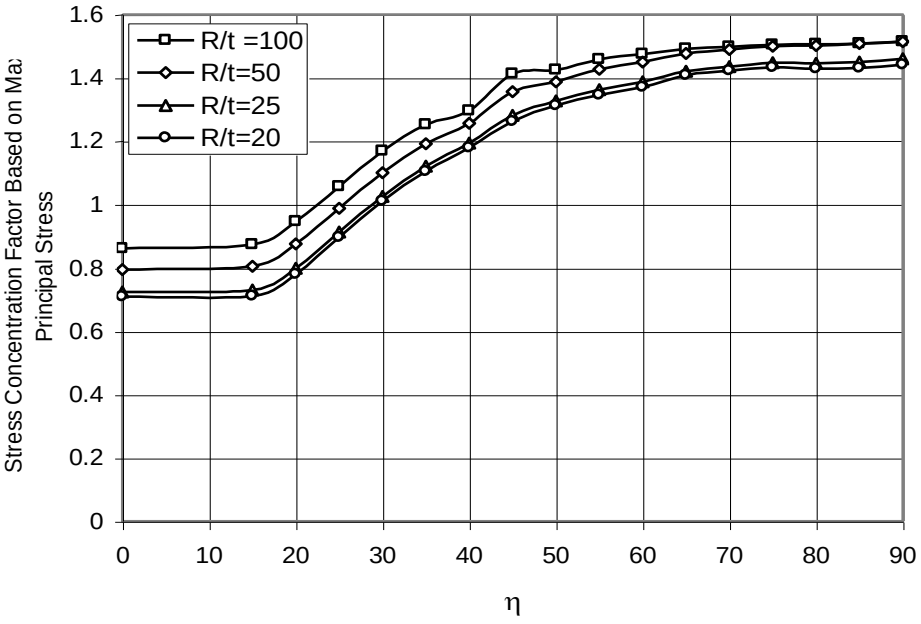


Fig.17 SCF along hole boundary in a shell with low modulus elliptic inclusion (Bottom surface)