SSLV324 - Elliptic ace in has tensile 3D bodystocking subject to loading

Abstract:

This test box models has double diffusion elliptic ace within has $3D$ bodystocking subject to has tensile loading. The purpose is to study the idealised behaviour of has ace using linear-elastic-fracture mechanics.

1 Reference problem

1.1 Geometry

The specimen configuration is nearENTED in half symmetry, ace shown in figure 1. It re-presscubic s.a with dimensions $(h=w=t=16)$ containing has double diffusion, elliptic ace with dimensions $c=a=1$. The specimen is subjected to has tensile load perpendicular to the planes of the ace and represents pure fashion 1 ace opening.

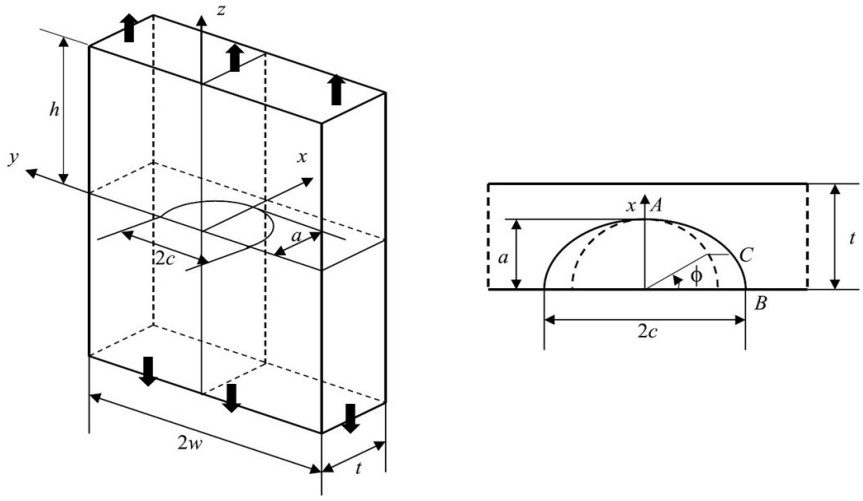


Fig.1 Specimen geometry

1.2 Material properties

The material of the specimen is assumed to Be homogeneous isotropic linear elastic with the following parameters:

- Young modulus $E=200\,000\,Mpa$,
- poisson' S ratio $\nu=0,3$.

1.3 Boundary conditions and loading

The structure is subjected to has tensile stress ($\sigma=1\,MPa$). Had to symmetry, only one quarter of the elliptical ace is considered and symmetric conditions are implemented one two faces FACE_LAT and FACE_AV.

2 Reference solution

2.1 Method used for the reference solution

For has circular ace of radius a in year medium infinity, subjected to has uniform tension σ according to the normal to the planes of the ace lips, T-stress is independent of the curvilinear X-coordinate along the ace face s and is expressed in the following way [1]:

$$T(s)=-\sigma_0$$

2.2 Reference results

By Considering the numerical been worth of the statement, we get: $T=-1\,MPa$.

2.3 Bibliographical references

1 X . Wang , Elastic T_stress solutions for semi-elliptical surface aces in finite thickness punts Engineering Fractures Mechanics , 70 (2003) 731-756

3 Model A

3.1 Mesh

The Quadratic mesh of structure is provided ace has MED format . Had to symemetry, only one quarter of the str CPU ture is represented, ace shown in figure 2.

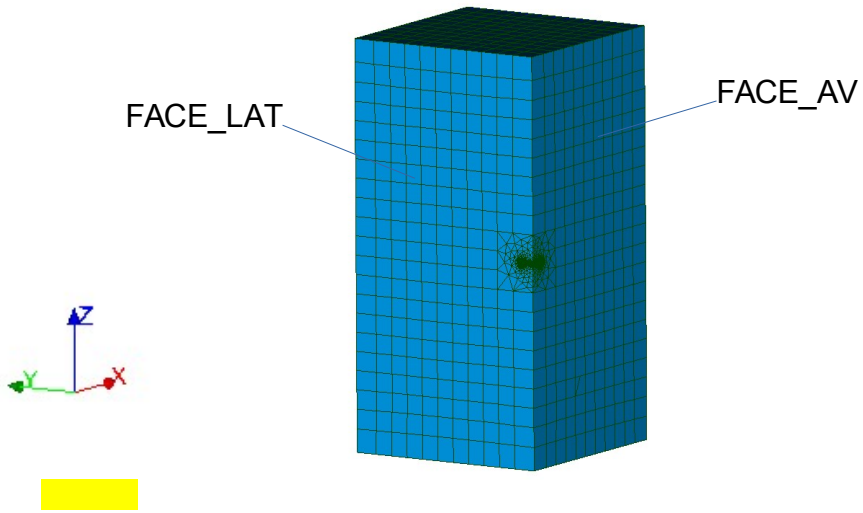
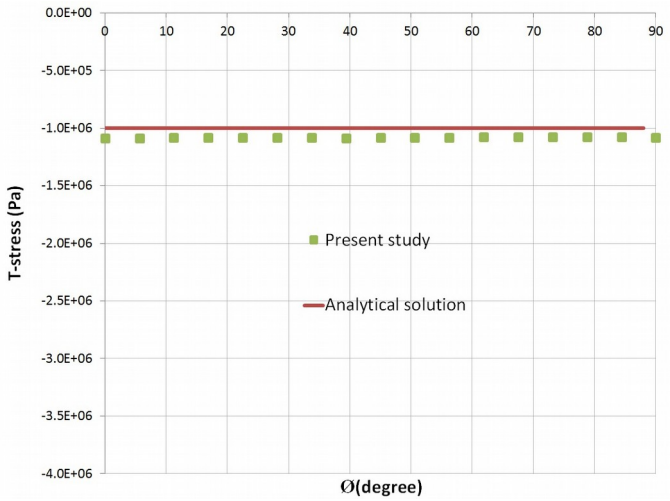


Fig.2 Mesh

3.2 Quantities tested and results

Identification	Type of Reference	Reference	% tolerance
T - MAX	ANALYTICAL	-1.E6	5.0
T - MIN	ANALYTICAL	-1.E6	5.0



4 Conclusion

Results are in good agreement with the theory.