

V-Shaped Incision Stress and Strain Finite Element Method Analysis

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Abstract: Fracture is commonly by the crack extension in reality, because the cause of crack is difficult to quantify, therefore, after the crack crack can continue to expand or crack fracture mechanics research has important theoretical significance and application prospect, finite element method (fem) is an important approach for the analysis of stress and strain, through the finite element method to analyze the v-shaped incision and boundary of stress and strain of stress concentration area has the actual practical significance.

Key words: Stress, Strain, V-Notch

INTRODUCTION

Fracture technology is developed in the recent decades is a new subject, from a macro perspective of continuum mechanics, its research object containing defects or cracks in the external conditions (load, temperature, medium corrosion, etc.) under the action of macroscopic crack extension, instability of cracking, propagation and crack arrest rule. Fracture mechanics applied mechanics structure damage problem in the study materials containing defects, because it is directly related to material or structure of the safety problems, although so late, but the experiment and theory are developing rapidly, and has been widely applied in engineering. Technology such as fracture mechanics has been applied to estimate the fatigue crack growth rate under different conditions, such as environmental problems, and because of these developments, in the design of structure with a fracture risk, using the fracture mechanics have larger grasp the result of the design. By finite element method to solve the stress and strain of the problems can be intuitive to see the size of the stress and strain, can

directly reflect the stress concentration area, and are generally stress concentration occurred on the border.

1 V-SHAPED INCISION PLANE

Any elastic mechanics problem in a project is a space problem, but if at some aspects of geometry size is greater than or much smaller than the size of the other two aspects, such as DAMS or a sheet, when the stress distribution and constraint conditions satisfy certain limit, then this kind of problem can be handled as approximate plane problems, and can do enough to give accurate results. Therefore, research on plane problem is with practical significance.

When an object can approximate as a plane, using the finite element method to analyze the actual situation of the stress and strain of the object, through the analysis of the results to see if it has the practical significance, is in line with the actual situation. So in the thesis the analysis can be seen as plane analysis of a three-dimensional object. To analyze the plane v-shaped incision and boundary of stress and strain.

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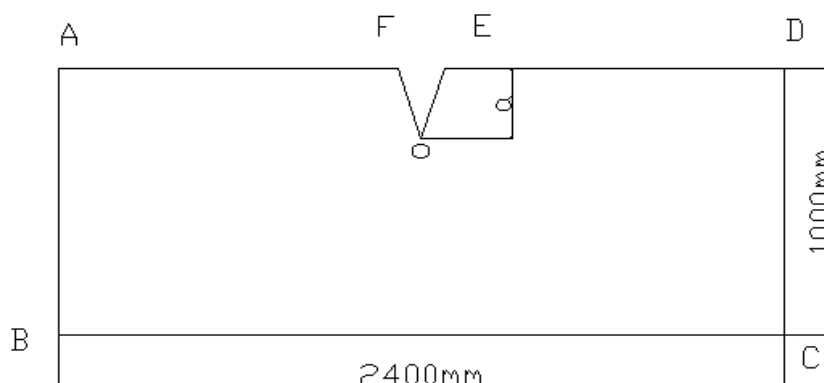


Figure 1 V-shaped incision plane

Under normal circumstances, the stress and strain are mainly concentrated in the border, so the boundary force is of practical significance and theoretical significance, and so on

plane stress and strain analysis is mainly analysis the force of the border. The paper is mainly to v-shaped incision and the boundary of the plane stress analysis and modeling.

2 ANSYS MODELING AND ANALYSIS



Figure 2 Plate model

The established plane v-shaped incision model as shown in figure 2, to the established model according to the figure 1, AF, FO, OE, DC, AB, BC path to analysis. Paper is the analysis of the stress and strain of the v-shaped incision, so the stress and strain, and borders. Mainly analyzes the v-shaped incision of stress and strain.

To establish a v-shaped incision path as shown in figure 3, figure 4 is the path of the v-shaped incision of left and right sides respectively.

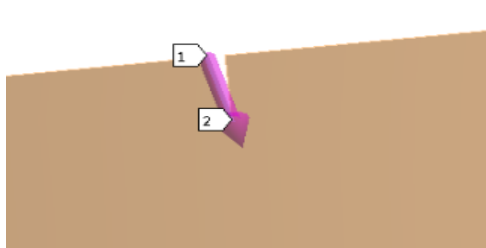


Figure 3 V-shaped incision left path

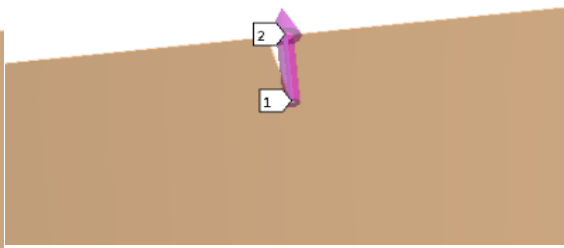


Figure 4 V-shaped incision right path

Adding in the model AB and DC sides of bending moment through ansys analysis of v-shaped notch strain as shown in figure 5, figure 6 and v-shaped incision strain as shown in figure 7 and figure 8.



Figure 5 V-shaped incision left strain



Figure 6 V-shaped incision right strain



Figure 7 V-shaped incision left stress



Figure 8 V-shaped incision right stress

From figure 5, figure 6, you can see in figure 7 and figure 8 v-shaped incision of strain and stress, can see from figure that maximize the strain and stress of all occurred in the top of the v-shaped incision, the hours at the bottom of the v-shaped incision, when the force is the largest at the top of the, it would be easier to make the crack extension, so when the crack of the object under the circumstance of

outside force of crack will constantly, until the object to failure.

Analyses the stress and strain of the v-shaped incision and analysis of plane stress and strain of the whole, the situation of the stress and strain analysis of plane boundary as shown in figure 9, in figure 10.

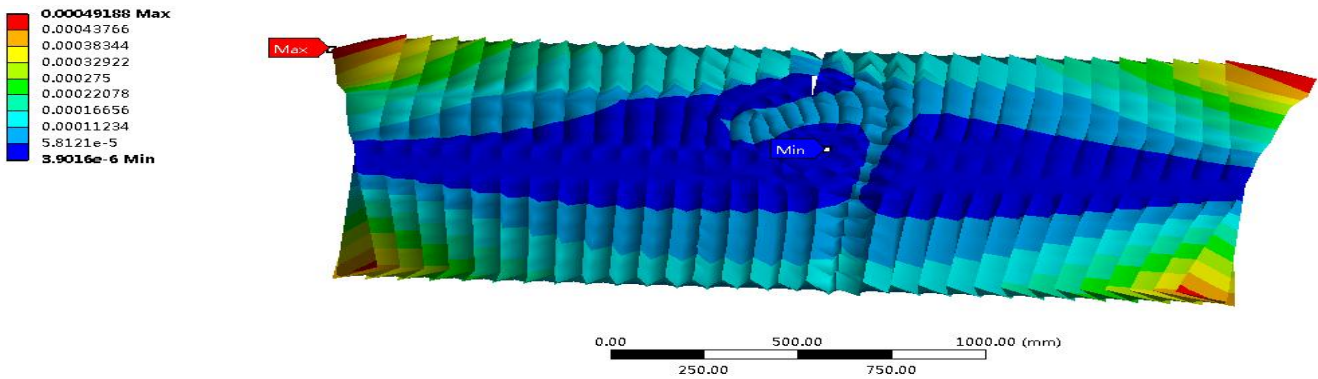


Figure 9 plane strain

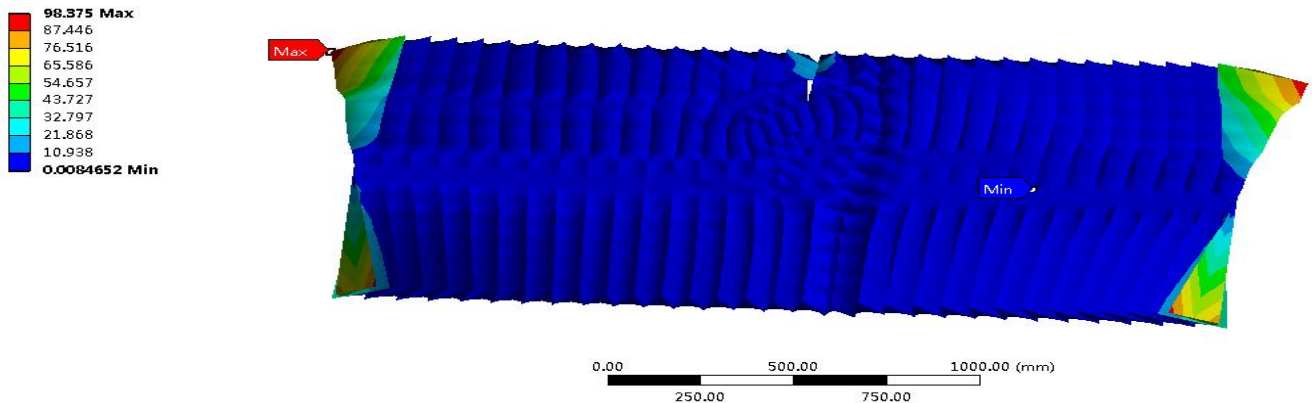


Figure 10 Plane Stress

From figure 9, figure 10 are out of the plane stress and strain of the actual situation, the biggest stress and strain are occurred in the plane on the border, and on the boundary of stress and strain are larger, and the smallest stress and strain are occurred in the interior of the plane, plane internal stress and the strain is relatively small.

3 CONCLUSION:

First of all, the plane of the paper is in fact a three-dimensional model, only when the length and width of an object is greater than the thickness of the object itself can take the object as a two-dimensional plane to deal with, so through the analysis of finite element method (fem), can clearly know the analysis of planar object is the maximum stress and strain of the occurred on the border, at the same time, maximum stress and strain of the v-shaped incision is in the top of the v-shaped incision, in actual life and the application will have to type to take measures to reduce the fracture caused by crack propagation. Has the practical significance and theory significance.

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