CHAPTER VII

CONCLUSIONS

This study deals with an elastic stress concentration factor of a parallel - side slit with semi - circular ends where $8 \leq c/r \leq 24$ and $30^\circ \leq \beta \leq 90^\circ$. The study also involves the stress concentration factor of a narrow slit with circular ends at c/r equal to 16 and $45^\circ \leq \beta \leq 90^\circ$.

For the parallel - side slit, it is concluded that a point of maximum stress intensity occurs on the circular arc of the slit and it is very close to the slit's end when β approaches 90 degrees and when c/r higher than 10. At β equals to 90 degrees, the point of maximum stress intensity coincides with the end point on the major-axis of the slit, and the stress concentration factor of a parallel - side slit with semi - circular ends can be determined by

$$K_F = 1 + 2\frac{\left(\frac{c}{r}\right) + 1}{\sqrt{2\left(\frac{c}{r}\right) + 1}}$$

which is the reduced form of eq. (32) for an elliptic hole when β equal to 90 degrees, and an error occurs within 6 percents. It is realized that when the inclination angle differs from 90 degrees, the stress concentration factor of the elliptic hole is not equal to that of the parallel - side slit and the eq. (32) cannot be used in calculation.

In case of the narrow slit with circular ends and the parallel - side slit with semi - circular ends, at c/r equal to 16, their stress concentration factors plotted against β agree very well with each other, and the error is less than one percent.

In general, for $8 \leq c/r \leq 24$ and $30^\circ \leq \beta \leq 90^\circ$, the stress concentration factor of a parallel - side slit with semi - circular ends can be calculated by

$$K_F = \frac{2\left(\frac{c}{r}\right) + 12}{\sqrt{3\left(\frac{c}{r}\right) + 16}} - \frac{1}{12}\left(\frac{c}{r}\right) \cos 2\beta$$

This equation is the modification of the equation for stress concentration factor at the end of an elliptic hole and can be employed for the stress concentration factor of a parallel - side slit with an error less than 10 percents, and values of c/r and β should be in the intervals specified above. It is recommended that if the stress concentration factor calculated by the above equation is to be used, the ratio of the width of the plate to the length of the slit should not be less than 5. If the calculated stress concentration factor based upon the net cross section is concerned, the largest effect due to the reduction of cross section is when $\beta = 90^\circ$. When the gross cross section is used the stress concentration factor, at c/r = 24, is maximized at 8.65 while the net cross section gives the value of 5.93