**Stress Intensity Factor for a Crack in a Strip**

by

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Dissertation submitted in partial fulfilment of
the requirements for the
Bachelor of Engineering (Hons)
(Mechanical Engineering)

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CERTIFICATION OF APPROVAL

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Approved by,

(Dr. Saravanan Karuppanan)

UNIVERSITI TEKNOLOGI PETRONAS

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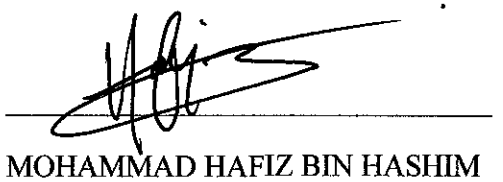
June 2010

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.



MOHAMMAD HAFIZ BIN HASHIM

# ABSTRACT

Stress intensity factor is used in fracture mechanics to more accurately predict the stress state near the crack tip caused by remote load or residual stress. Stress intensity factor characterizes the crack-tip condition in a linear elastic material.

In this project, the stress intensity factor at the crack tip for several crack geometry in finite strip will be determined by using finite element method. ANSYS software will be used to model and analyse the crack geometry to determine the stress intensity factor.

The results obtained from ANSYS will be compared with the solutions available in the literature. From the comparison the accuracy of the ANSYS results can be determined.

# ACKNOWLEDGEMENTS

The author wishes to take the opportunity to express his utmost gratitude to the individual that have taken the time and effort to assist the author in completing the

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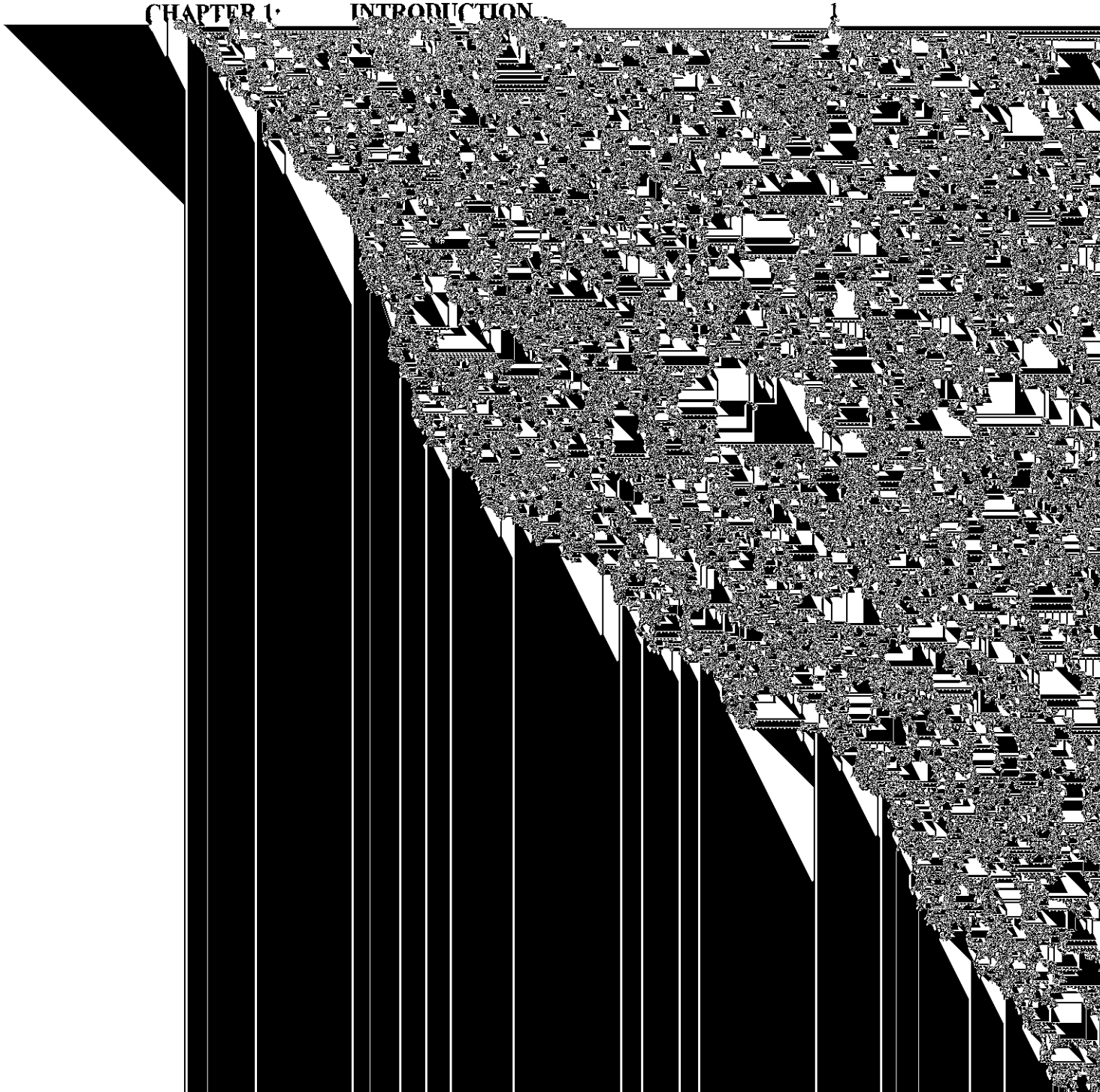

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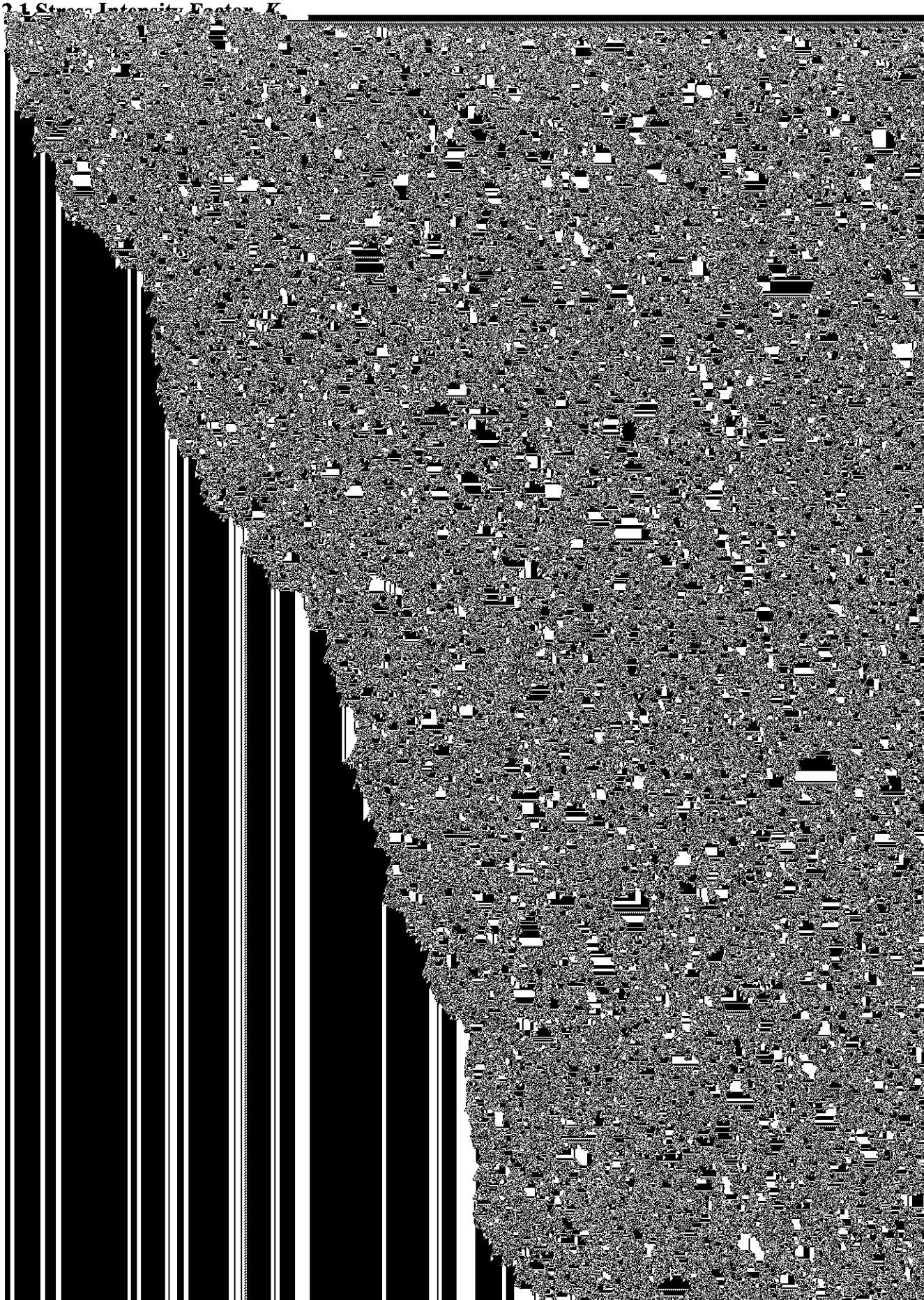
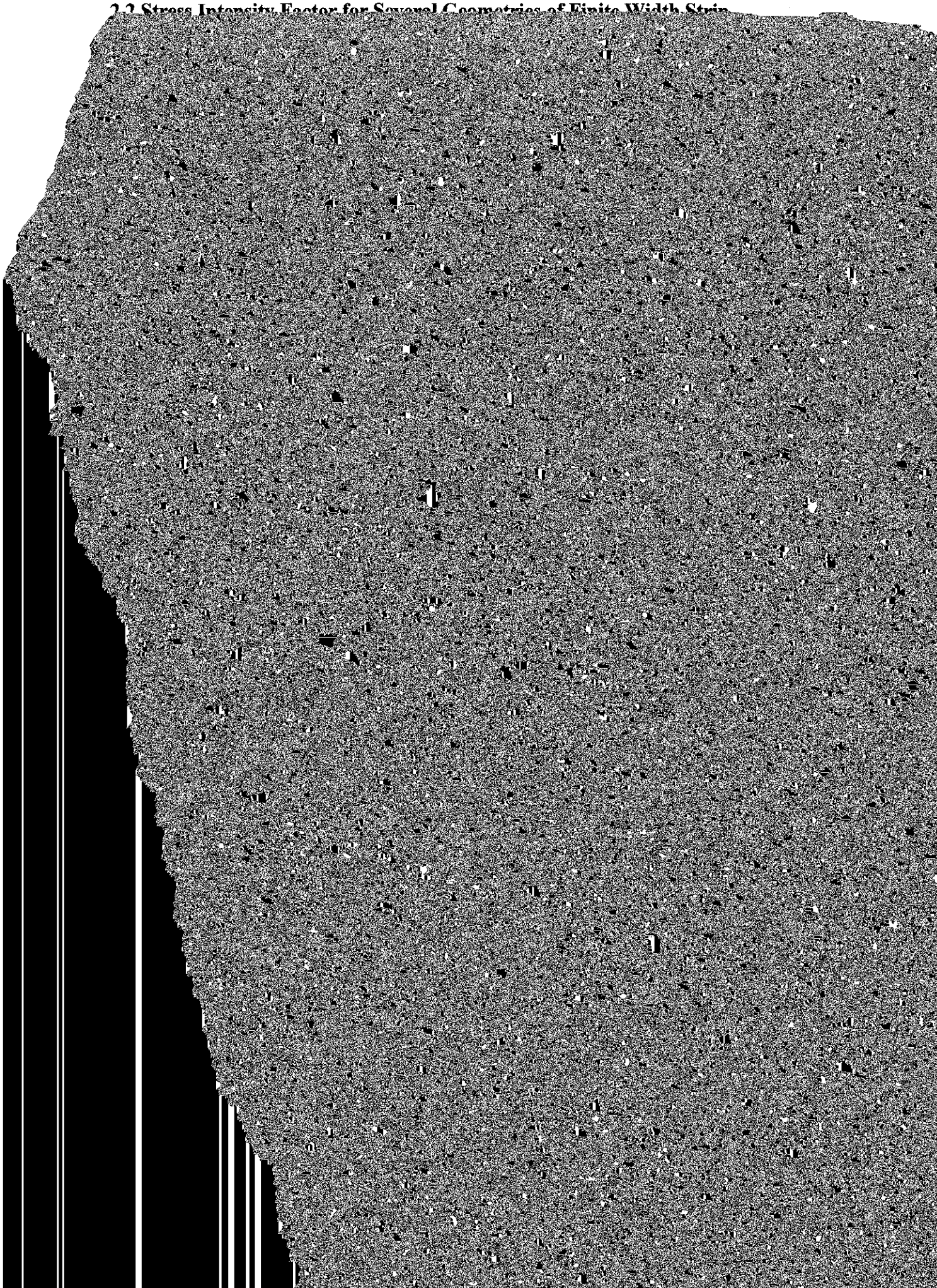


## 2.2 Stress Intensity Factor for Several Geometries of Finite Width Strip



### 2.2.6 Center Crack in a Finite Width Strip (Mode III Loading)

Figure 2.6 shows the geometry of a center crack in a finite width strip subject to Mode III loading [3].

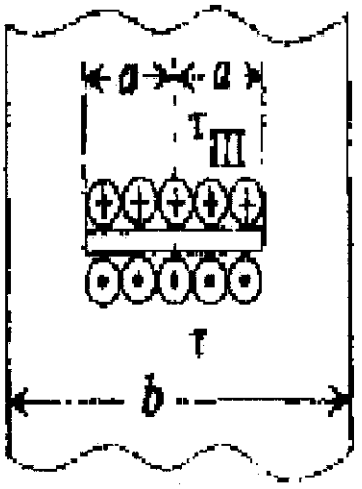



Figure 2.6: Geometry of a center-cracked strip subject to Mode III loading

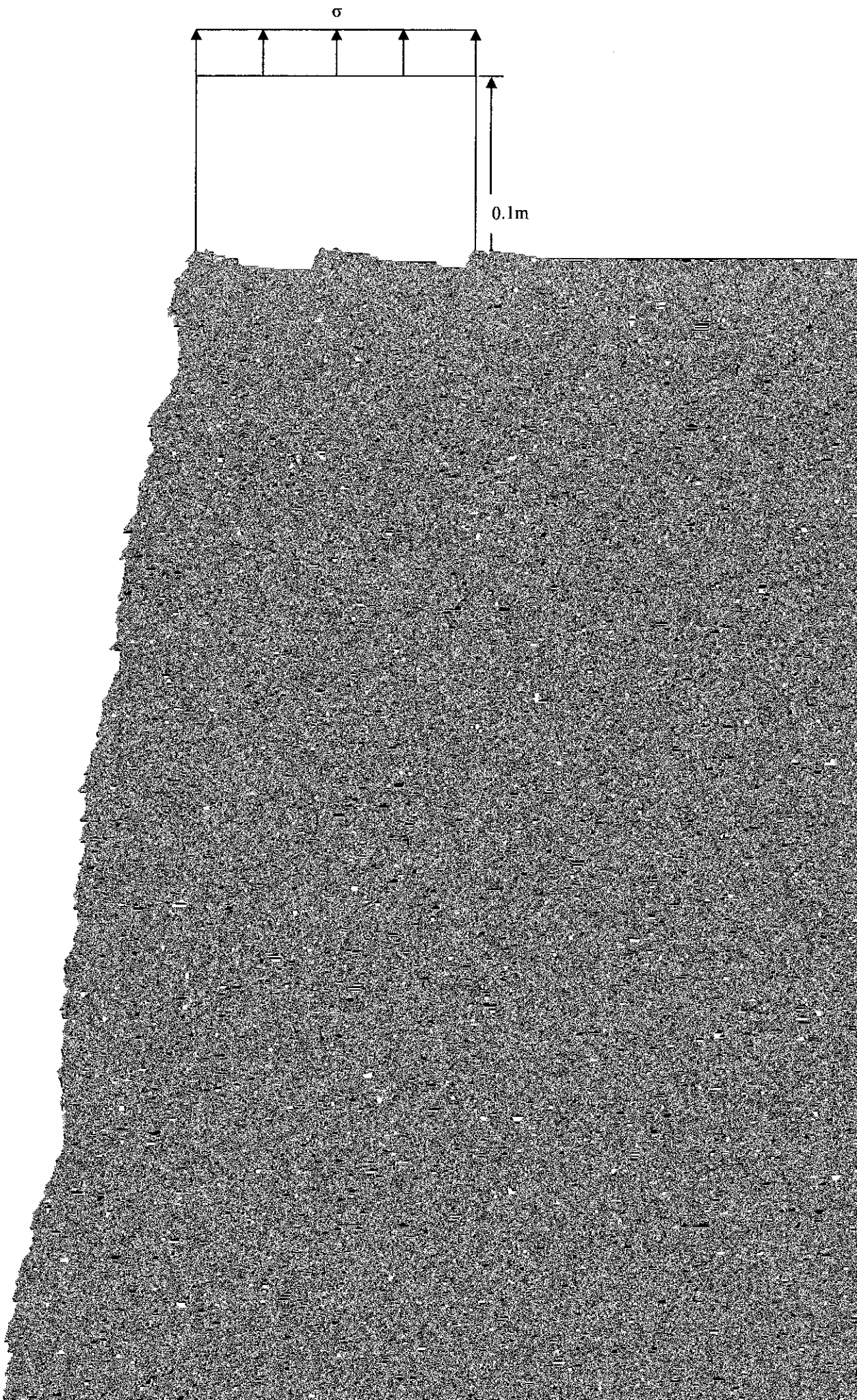
Geometry factor:

$$F_{III}\left(\frac{a}{b}\right) = \sqrt{\frac{b}{\pi a}\tan\frac{\pi a}{b}}. \tag{11}$$

### 3.3 Modelling of Crack Geometry in ANSYS

ANSYS software is used to model and perform finite element analysis on all crack

### 3.3.1 Modelling of Center-Cracked Strip Subject to Mode II Loading


σ
0.1m

# CHAPTER 4
# RESULTS AND DISCUSSIONS

## 4.1 Results of the Crack Geometry Subject to Mode I Loading

# CHAPTER 5

## CONCLUSIONS AND RECOMMENDATIONS

## 5.2 Recommendations

Recommendations for future works of this project are as follow:

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