Predicting the Crack Growth Behavior in a Filled Elastomer

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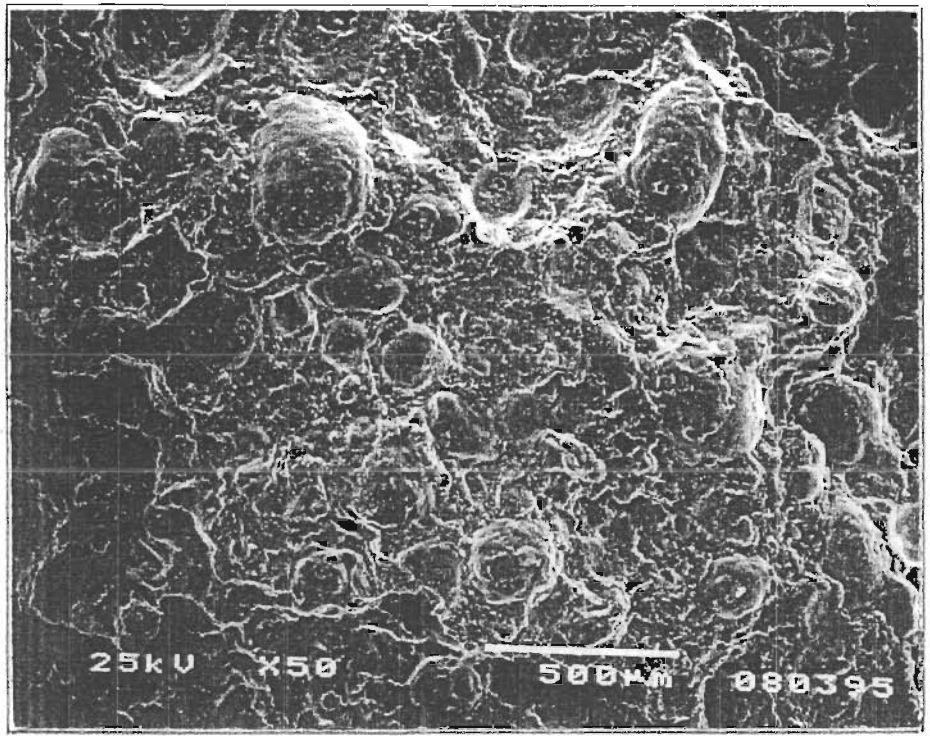
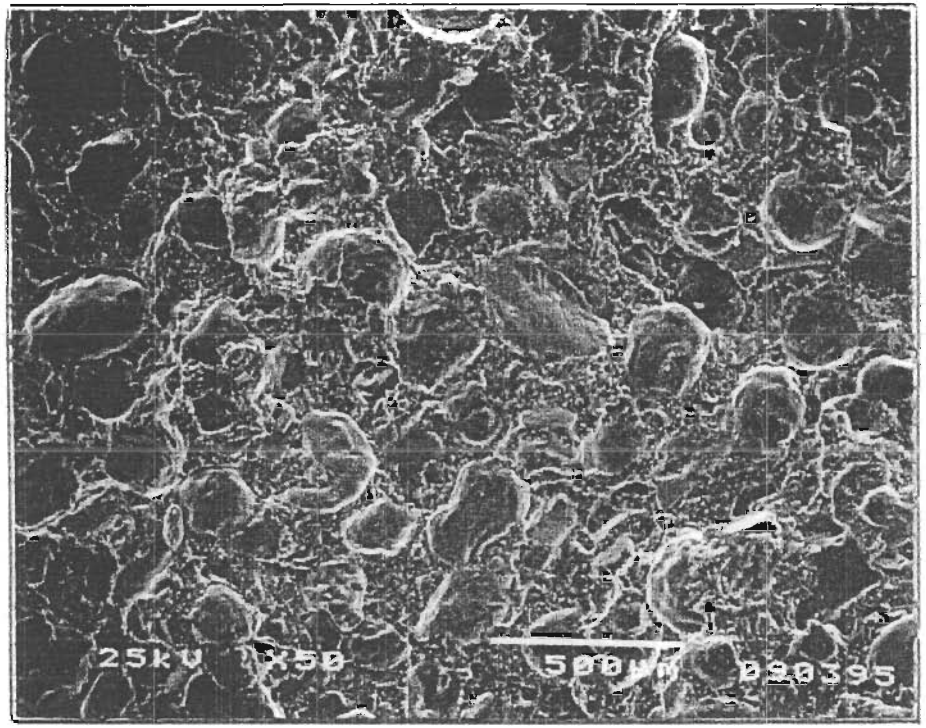
Objectives

- Investigate the Effect of Confining Pressure on the Crack Growth Behavior in the Material.
- Predict the Crack Growth Behavior in the Material.

Fracture Surface Under Different Confining Pressures

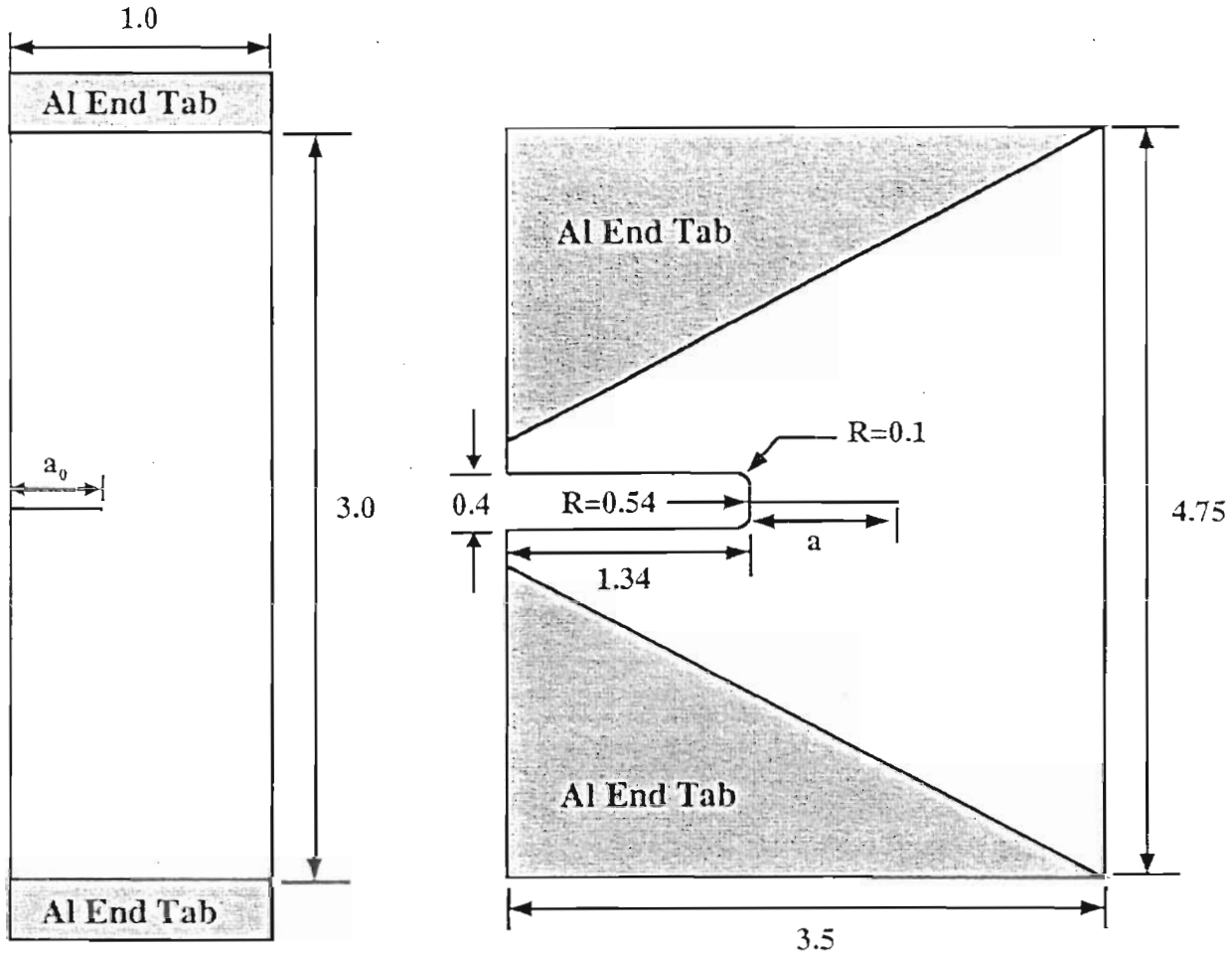


Pressure = 72.7 psi



Pressure = 1744 psi

Specimen Geometry

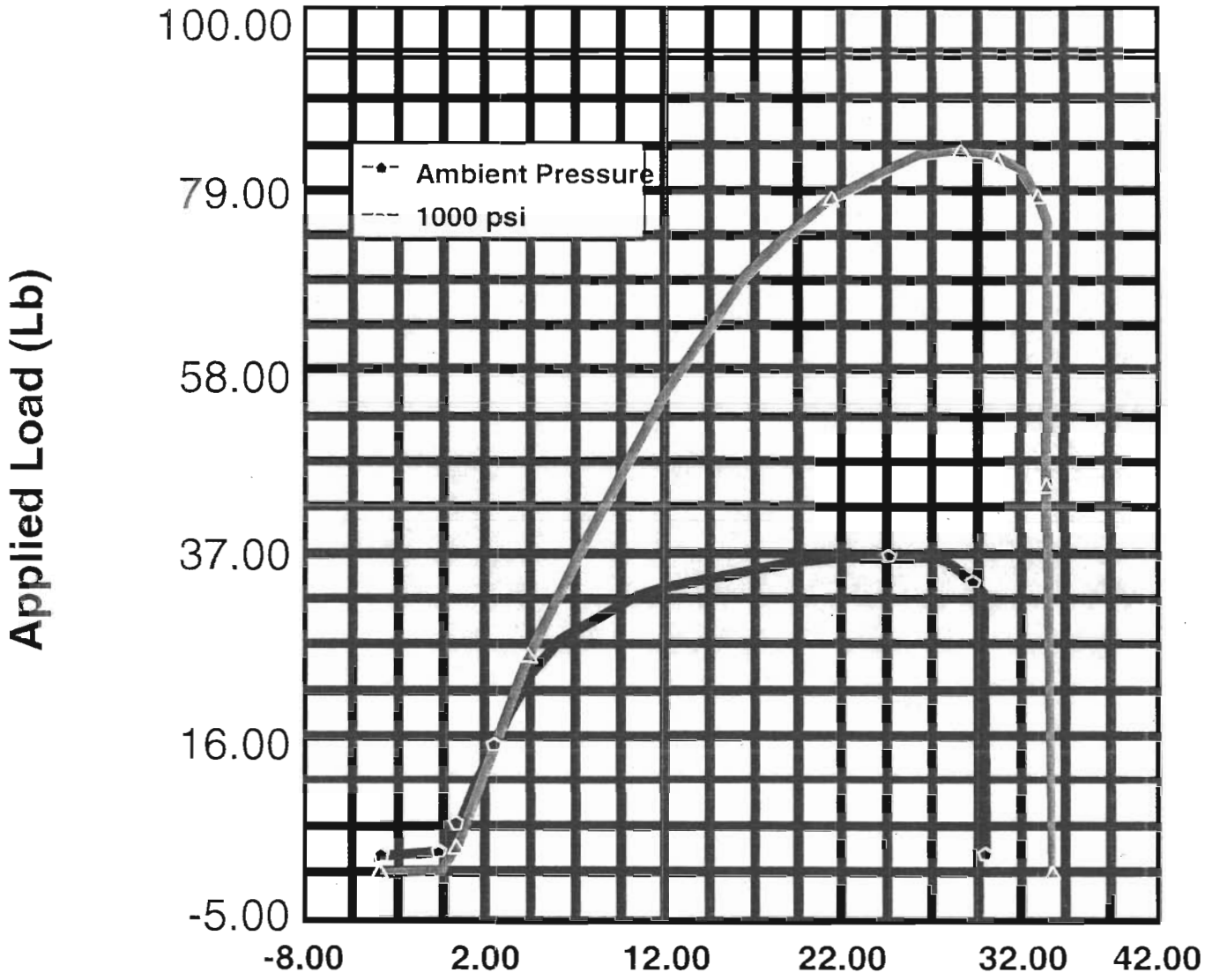


Uniaxial Specimen

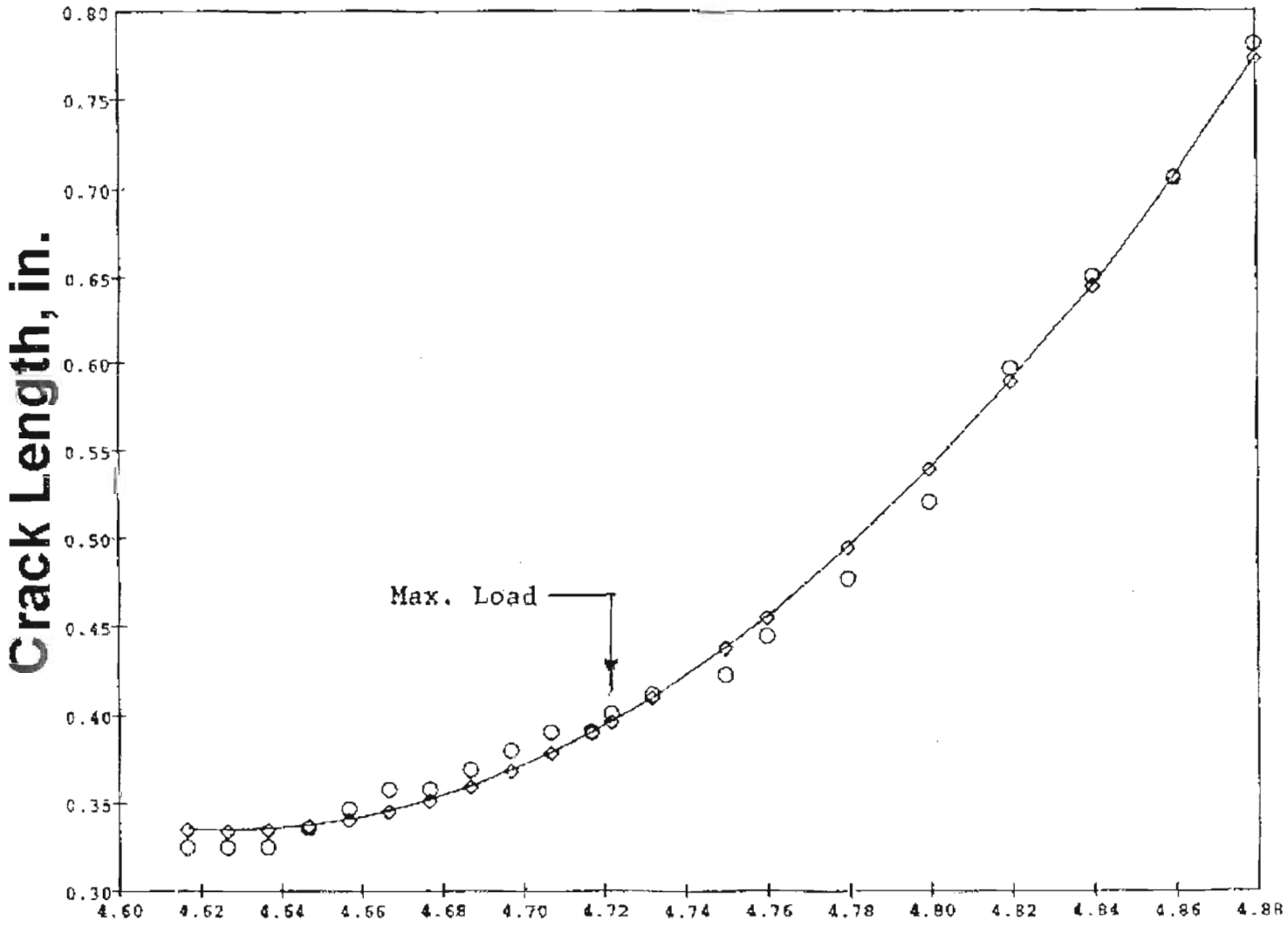
Wedge Specimen

(all dimensions in inches)

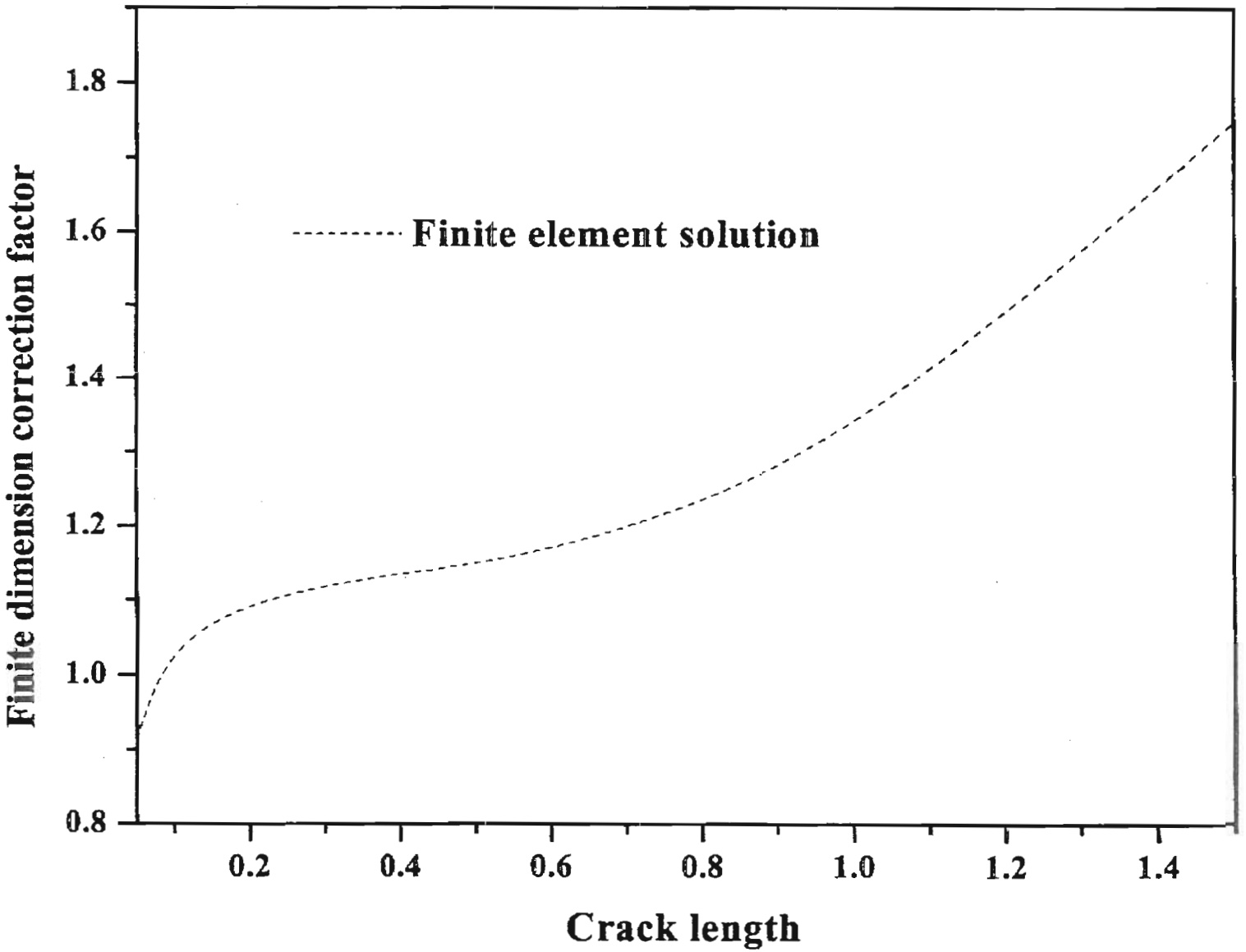
Applied Load Vs. Strain



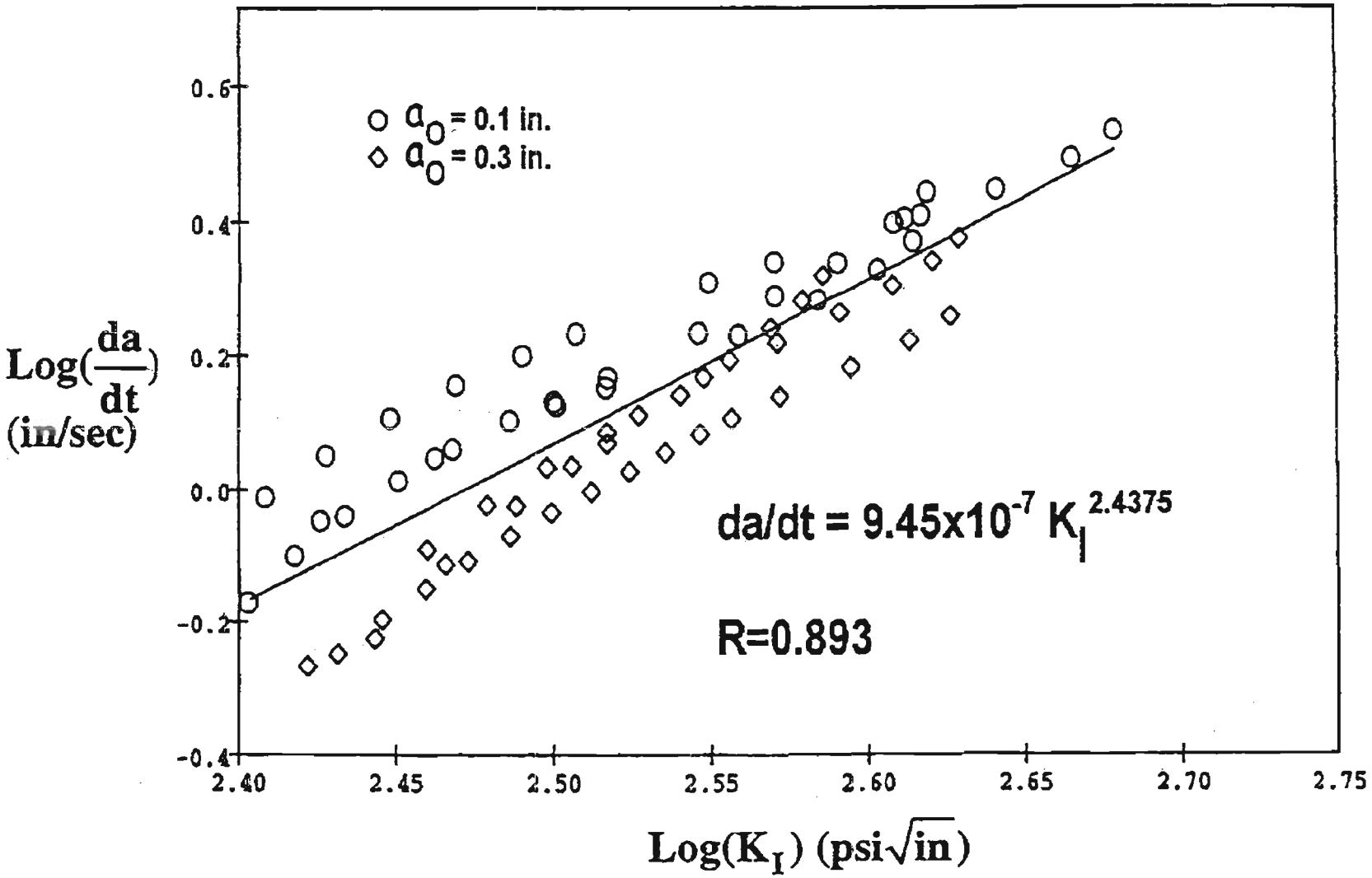
Crack Length Vs. Time Curve



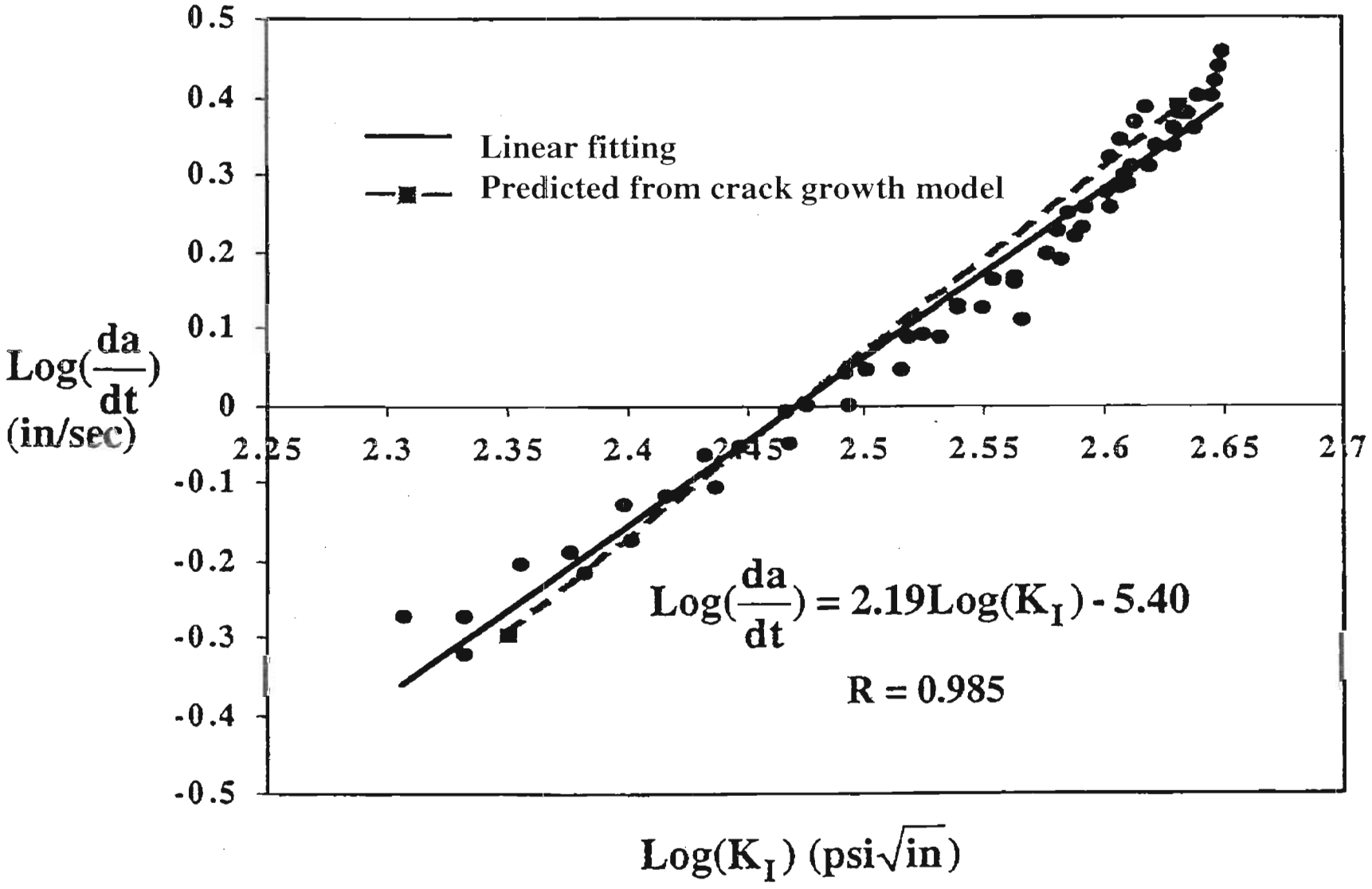
Finite Dimension Correction Factor versus Crack Length (Poisson's Ratio = 0.49)



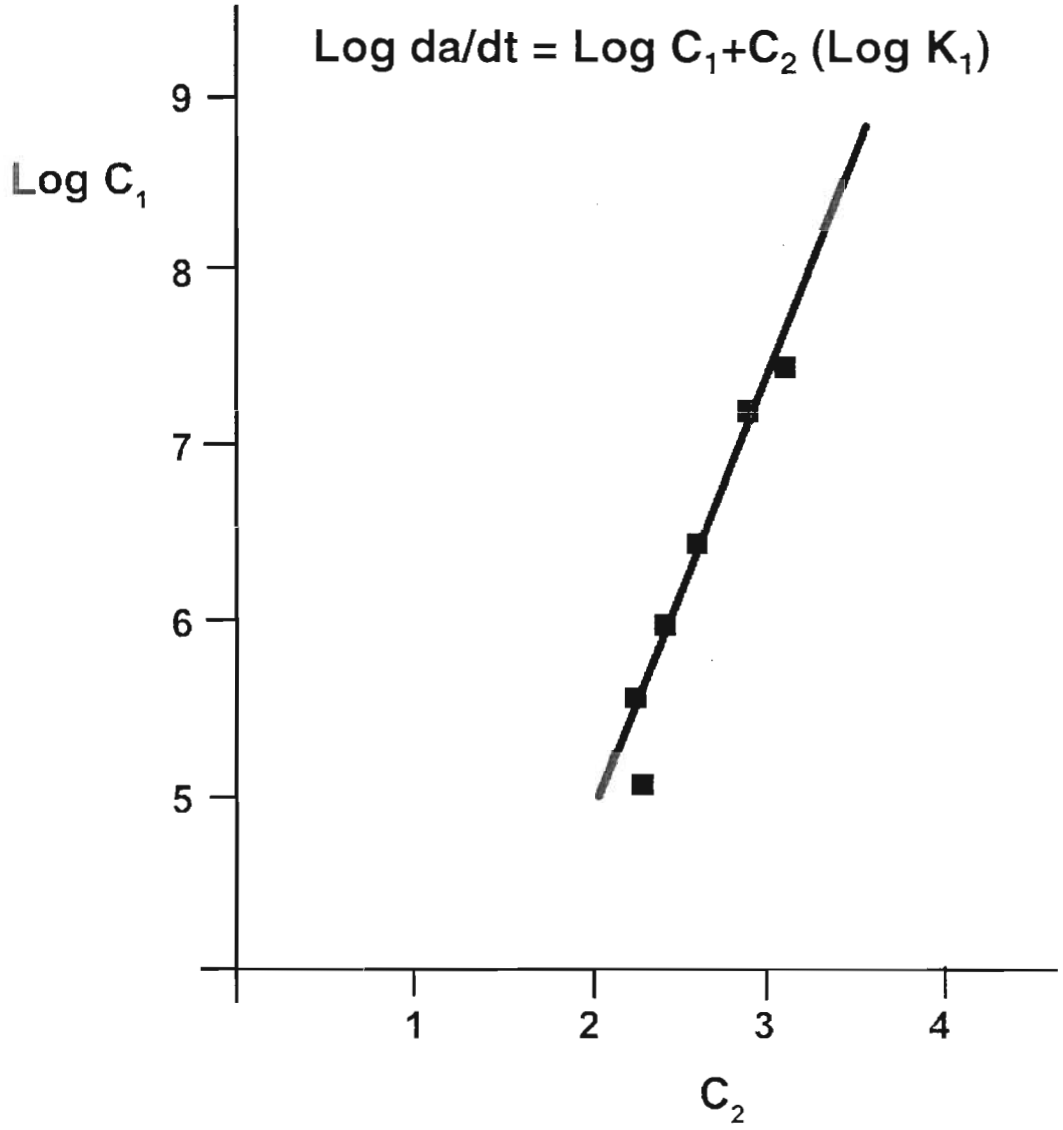
Crack Growth Rate versus Mode I Stress Intensity Factor (Uniaxial Specimen)



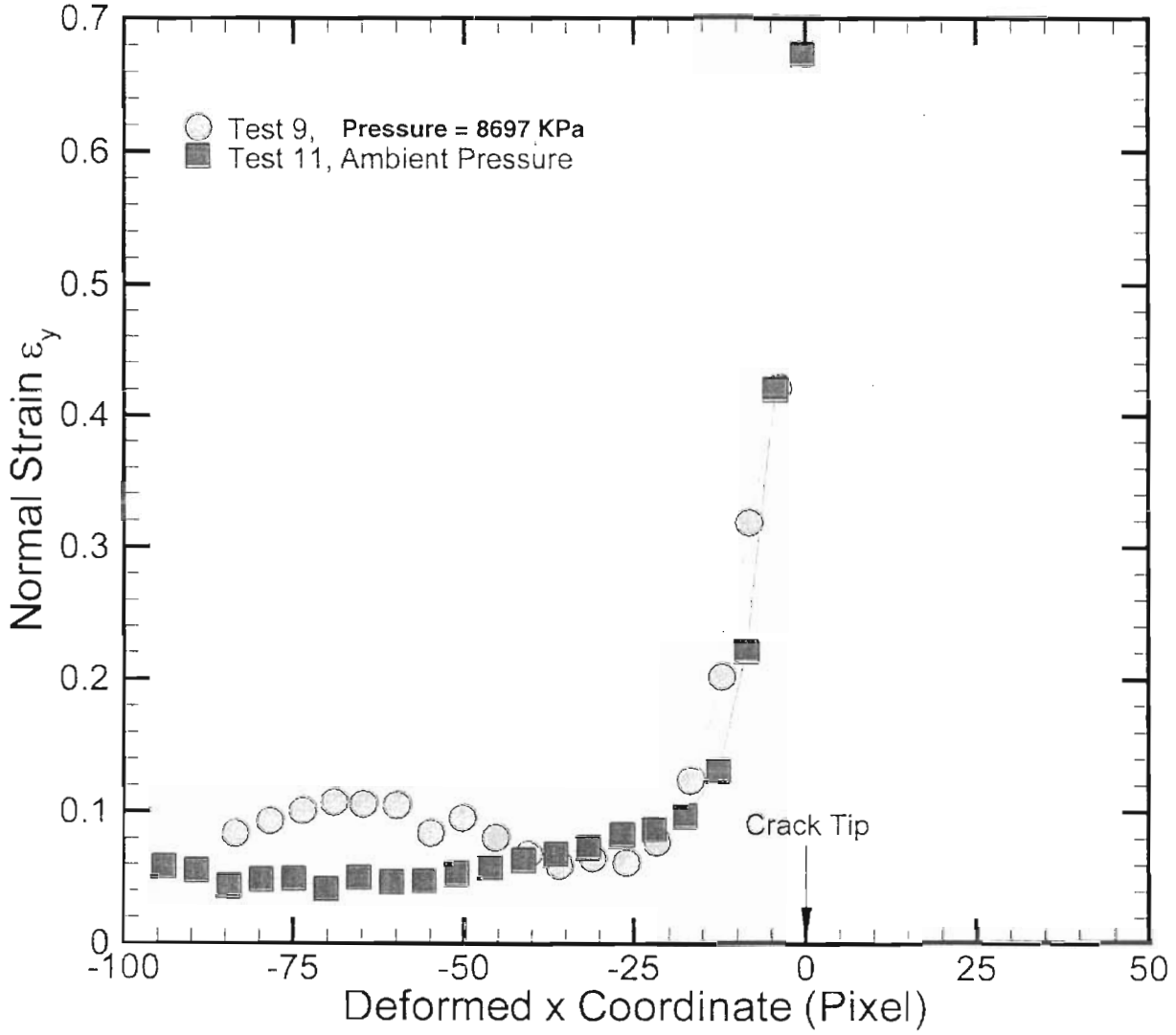
Crack Growth Rate versus Mode I Stress Intensity Factor (Wedge-Shaped Specimen)



Log C_1 versus C_2



Normal Strain Distribution Ahead of the Crack Tip at the Onset of Crack Growth



Conclusions

- Under the confining pressure, the crack grows stably until the specimen fractured.
- A Power law relationship exists between the crack growth rate and the Mode I stress intensity factor.
- A good correlation exists between the predicted and the measured crack growth rate.