

REPORT DOCUMENTATION PAGE

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Standard Form 298 (Rev. 8-98)
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36 separate files are enclosed

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MEMORANDUM FOR PR (In-House Publication)

FROM: PROI (TI) (STINFO)

15 May 2000

SUBJECT: Authorization for Release of Technical Information, Control Number: **AFRL-PR-ED-TP-2000-116**
Liu, C.T., Miller, T.C., "Effect of Crack Size on Initiation and Growth Behavior in a Particulate Composite Material"

SEMIX International Congress on Experimental Mechanics (Statement A)
(Orlando, FL, 05-08 Jun 2000) (Submission Deadline: 31 May 00)

1. This request has been reviewed by the Foreign Disclosure Office for: a.) appropriateness of distribution statement, b.) military/national critical technology, c.) export controls or distribution restrictions, d.) appropriateness for release to a foreign nation, and e.) technical sensitivity and/or economic sensitivity.

Comments: _____

Signature _____ Date _____

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Comments: _____

APPROVED/APPROVED AS AMENDED/DISAPPROVED

ROBERT C. CORLEY (Date)
Senior Scientist (Propulsion)
Propulsion Directorate



Effect of Crack Size on Growth Initiation and Propagation Behavior in a Particulate Composite Material

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&

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AFRL/PRSM

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For Public Release

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Distribution Unlimited**

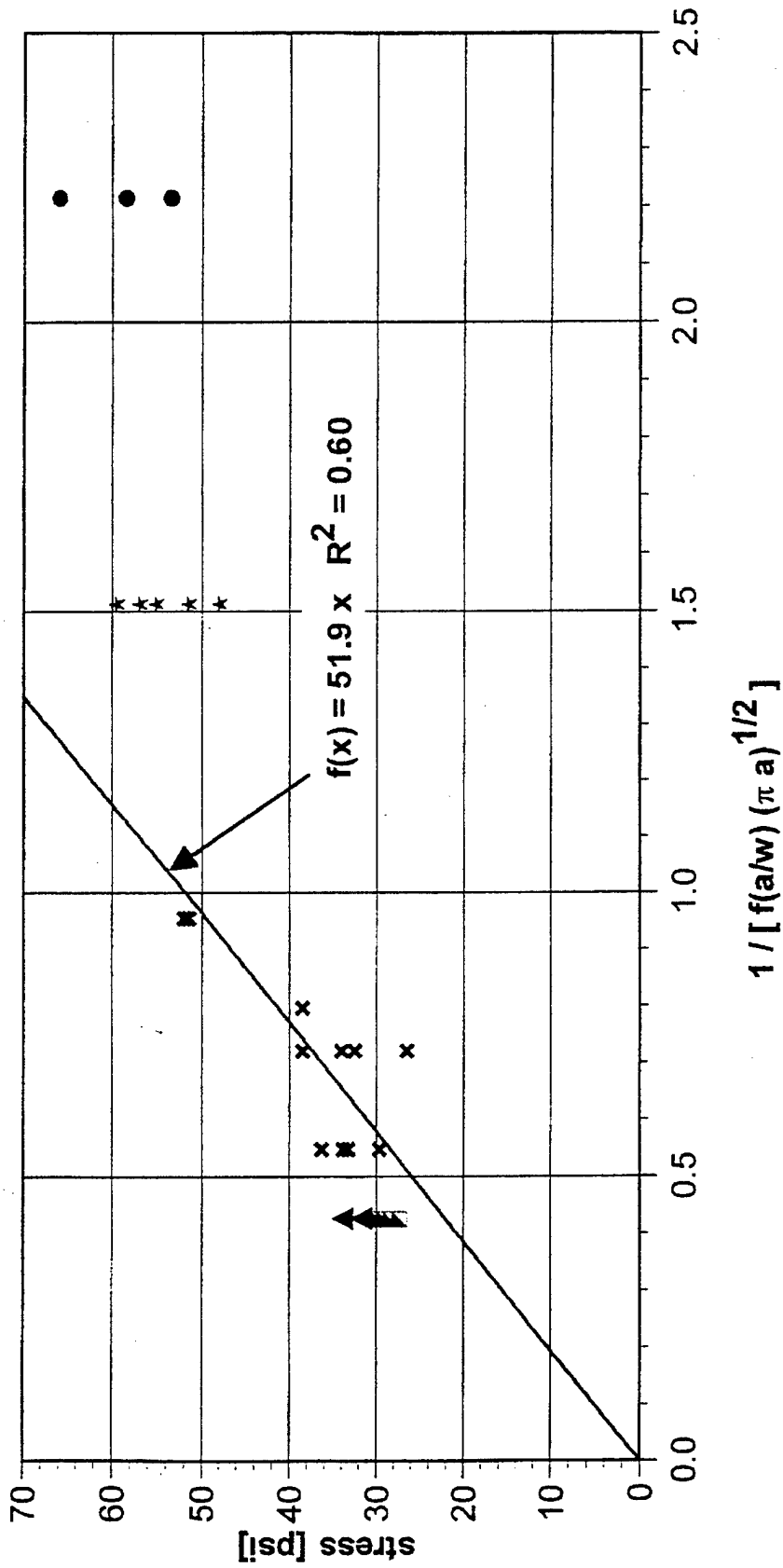


Objectives

- Investigate the Effects of Specimen Thickness and Initial Crack Length on the Crack Growth Behavior in a Particulate Composite Material.
- Specimen Thickness: 0.2 in., 0.5 in., 1.0 in., and 1.5 in.
- Initial Crack length: 0.1 in. and 0.3 in.



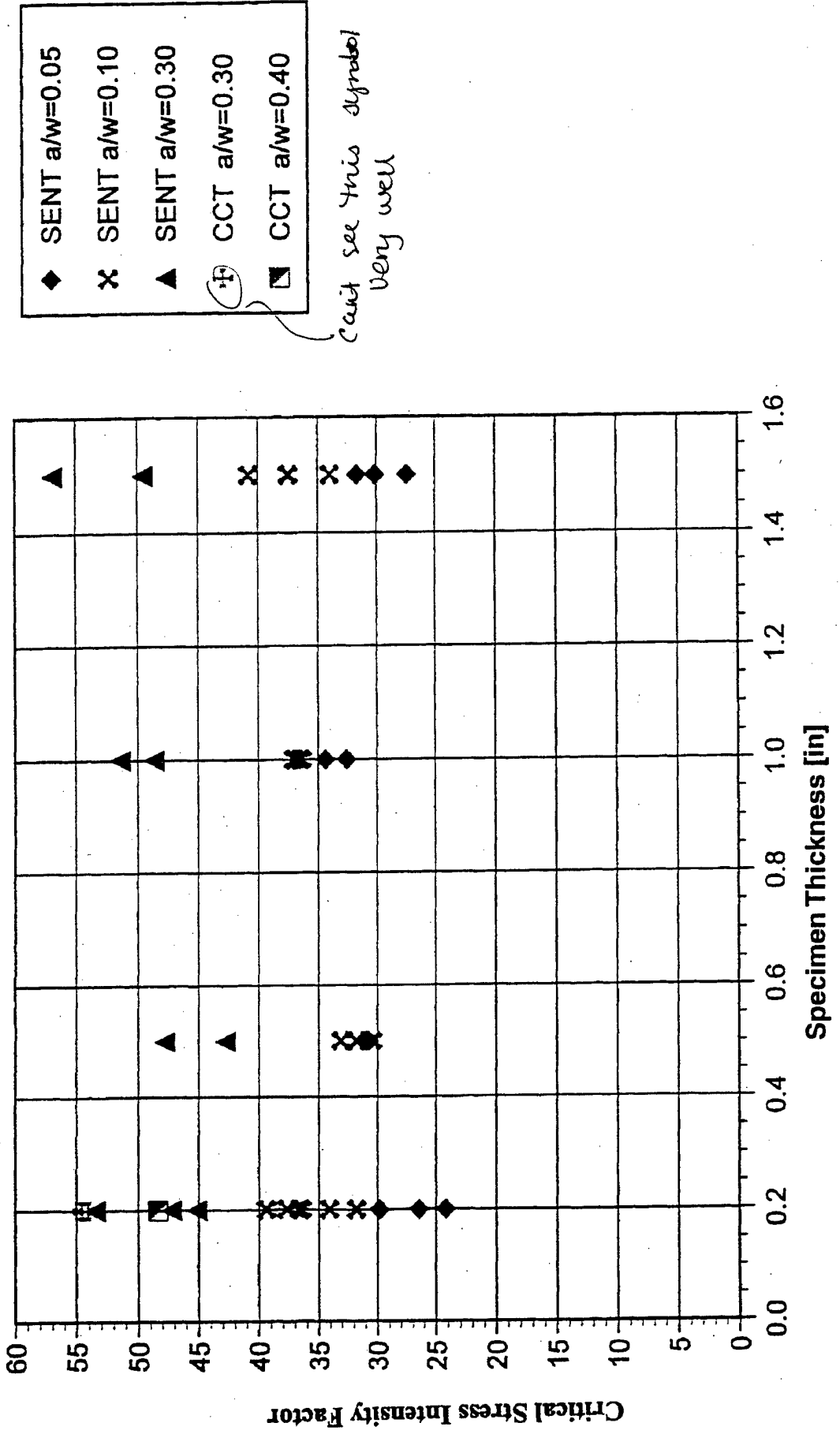
Determination of the Critical Initiation Stress Intensity Factor



- SENT (a/w=0.05)
- ★ SENT (a/w=0.10)
- ▲ 3" gage free grips
- 5" gage free grips
- x combined data



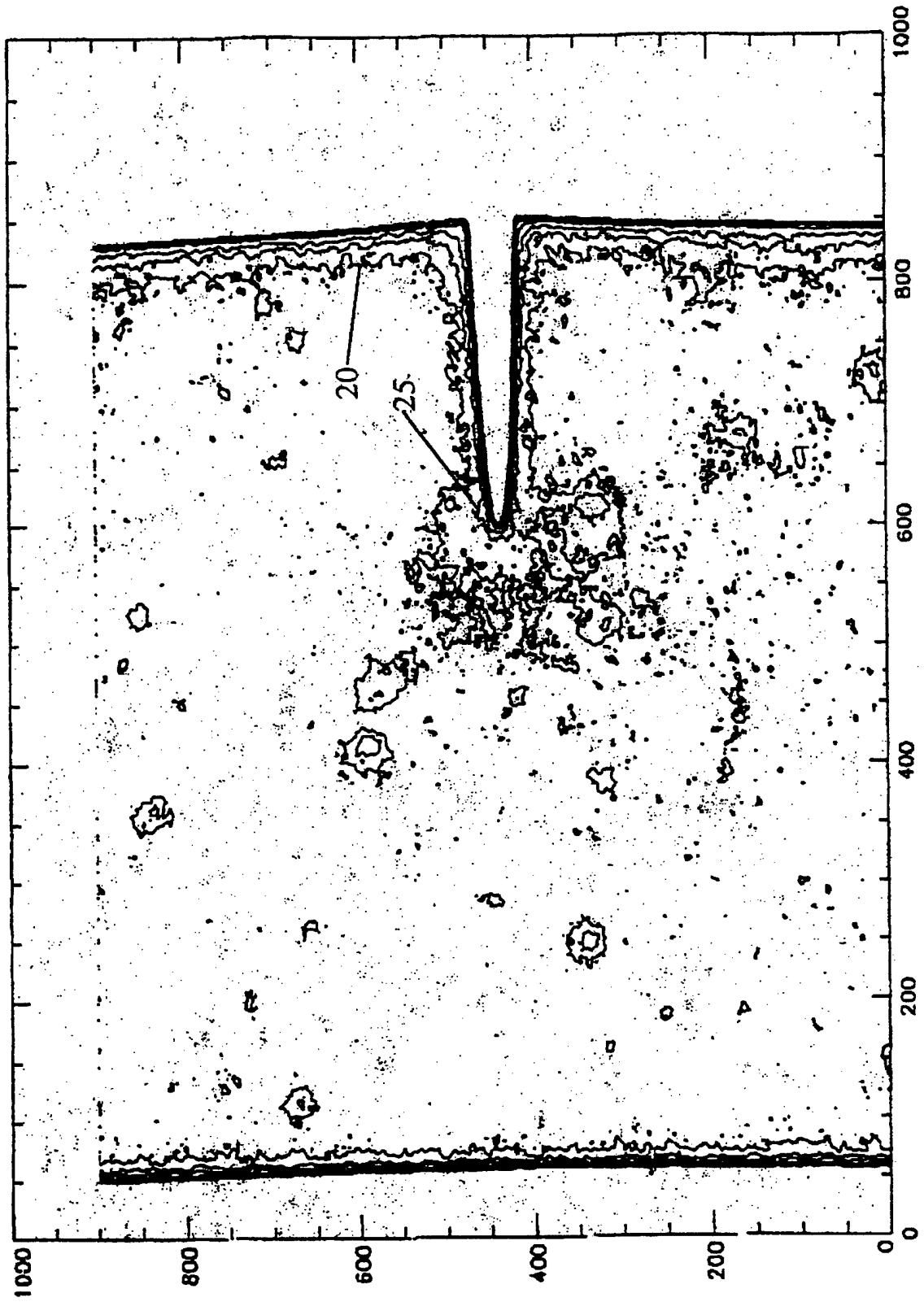
Critical Initiation Stress Intensity Factor Vs. Specimen Thickness



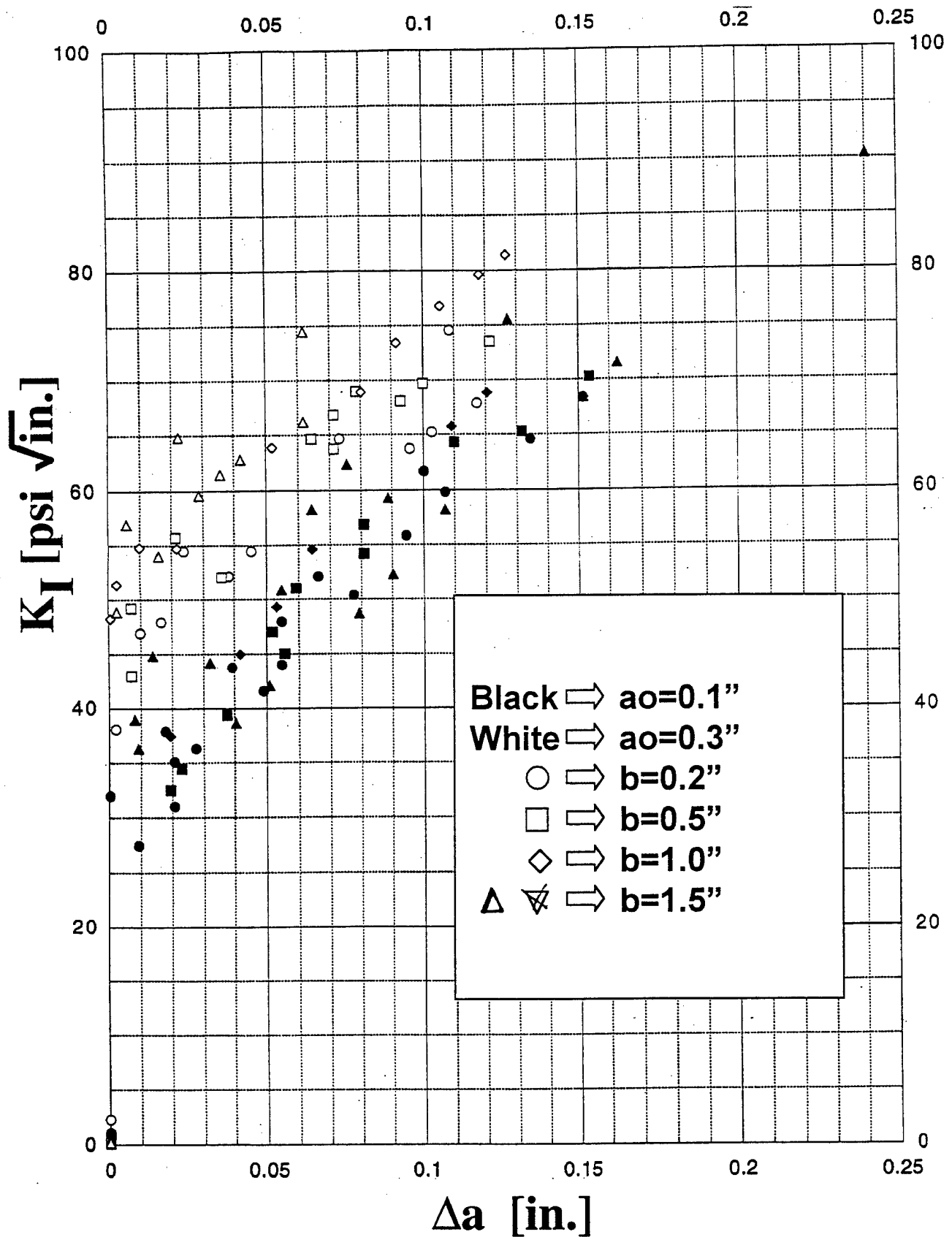
Iso-Intensity Contour Plot of the X-Ray Energy Transmitted through the Specimen (Prior to Growth)



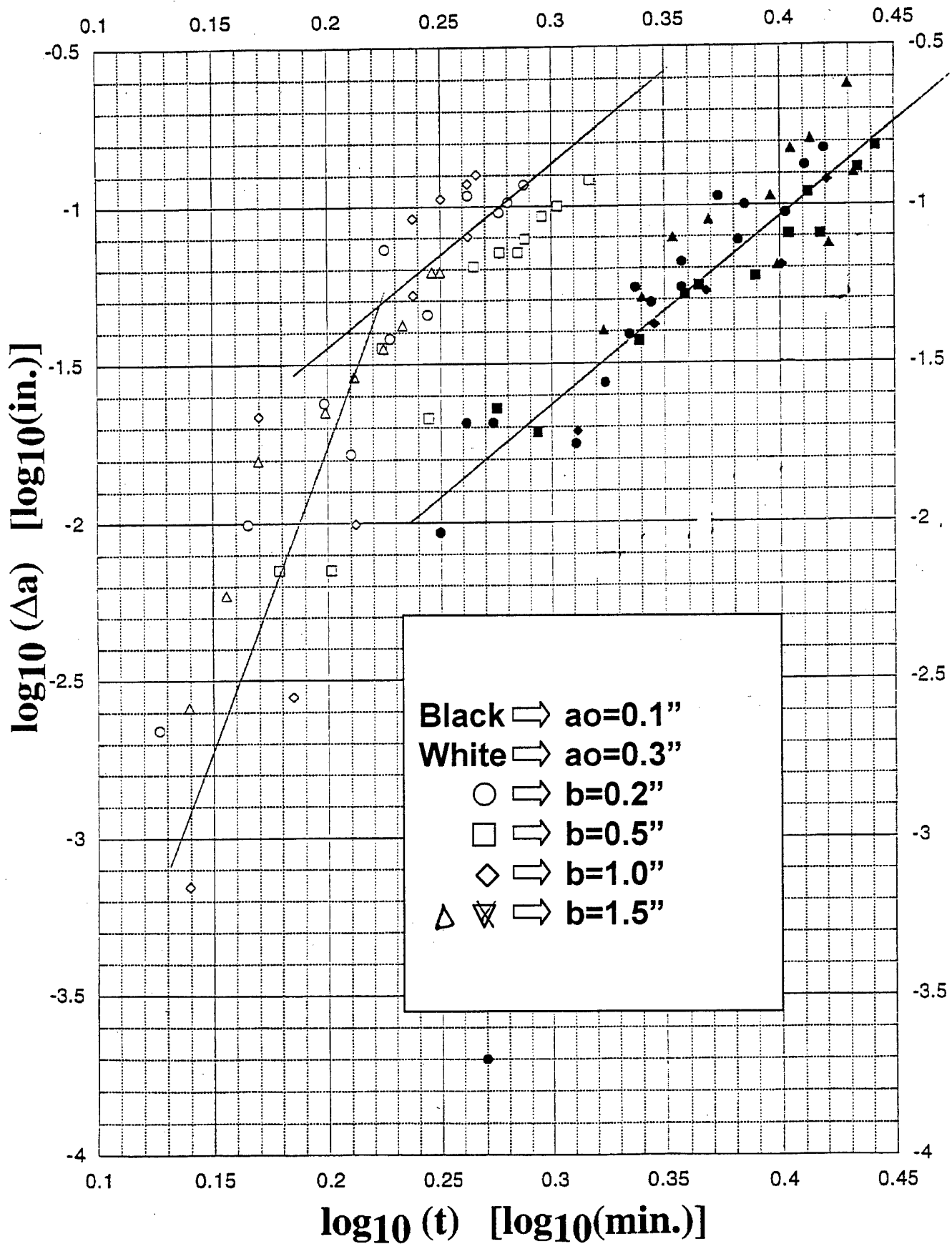
Iso-Intensity Contour Plot of the X-Ray Energy Transmitted through the Specimen (After Growth)



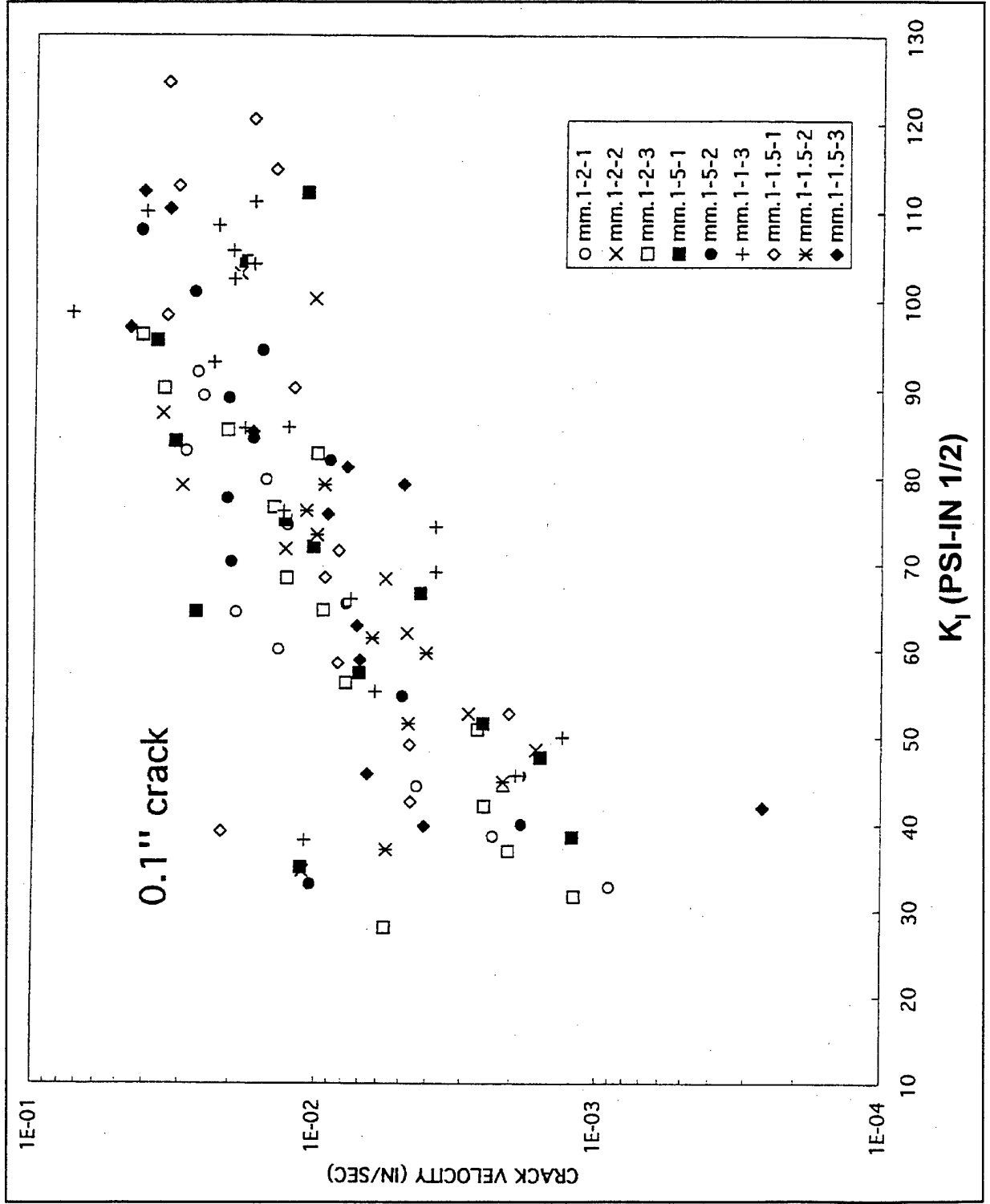
Crack Growth Resistance Curves



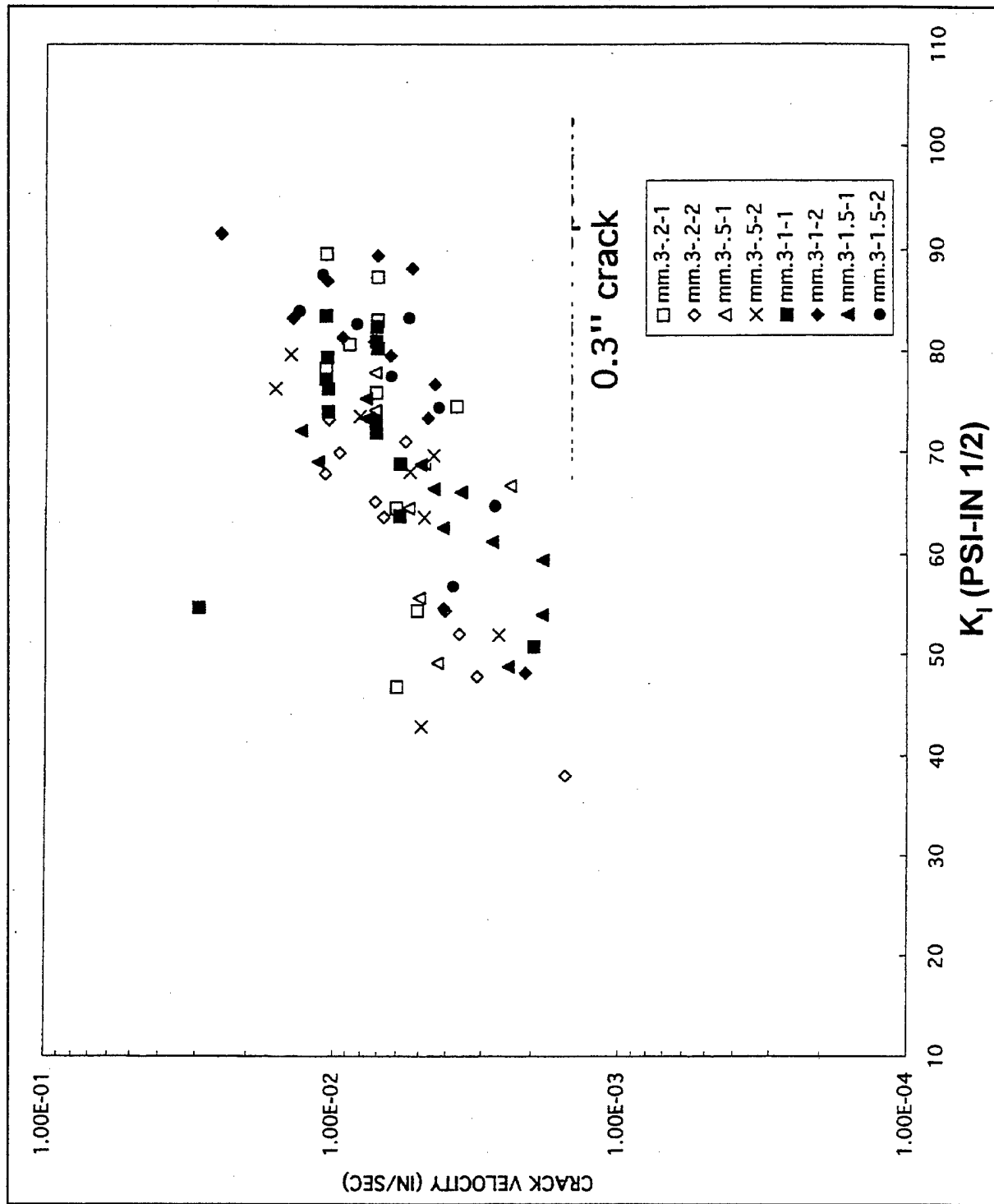
Crack Growth Curves



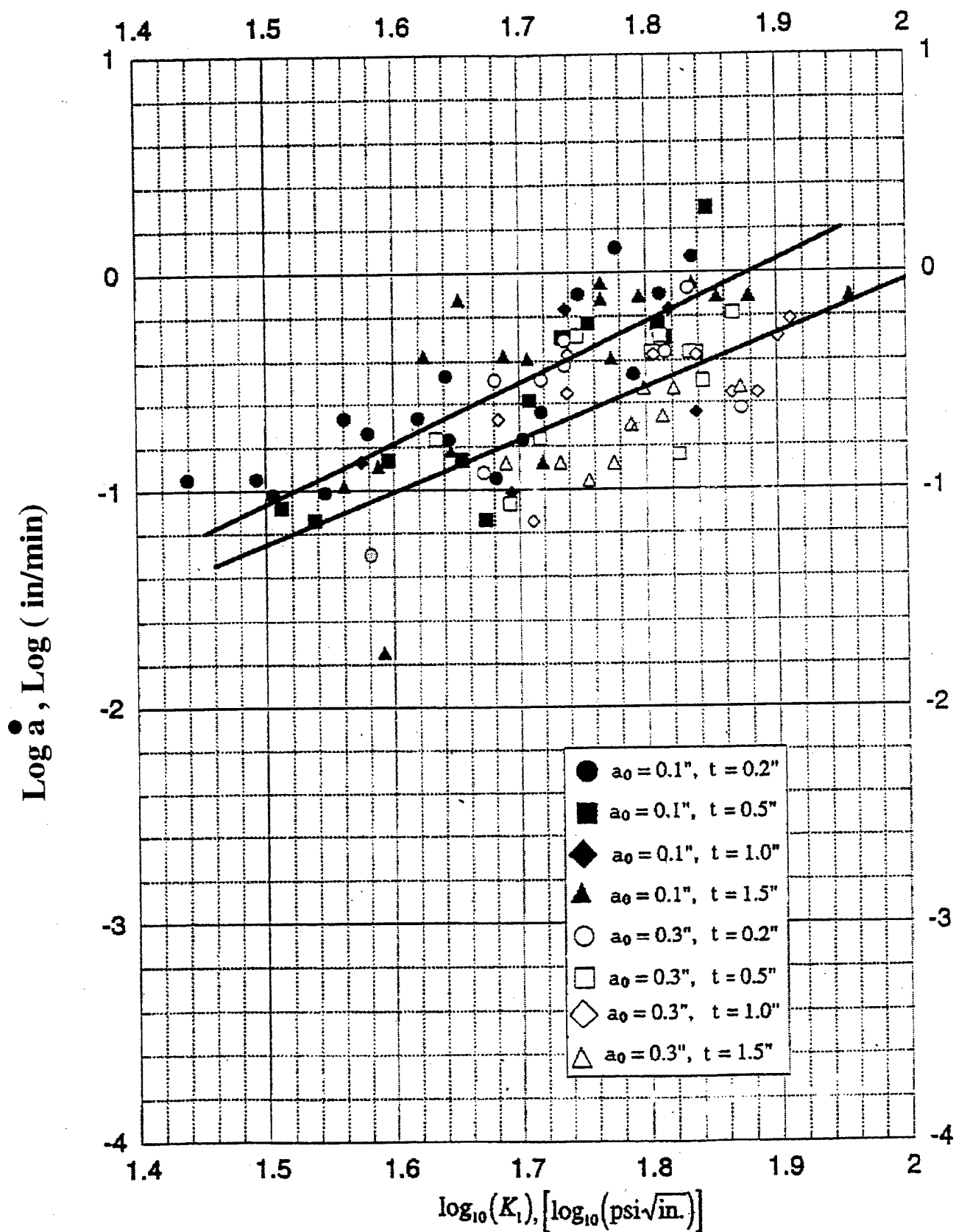
Crack Growth Rate Vs. Stress Intensity Factor



Crack Growth Rate Vs. Stress Intensity Factor



Crack Growth Rate Vs. Mode I Stress Intensity Factor for Different Initial Crack Lengths and Specimen Thickness





Conclusions

- The Initiation Mode I Stress Intensity Factor K_{IcI} and the Crack Growth Behavior Is Insensitive to the Specimen Thickness.
- Classical Linear Fracture Mechanics Can Not Be Used to Determine K_{IcI} for Initial Crack Length Equal to or Less Than 0.1 Inches.
- Initial Crack Length Has No Significant Effect on the Crack Growth Behavior.
- There Is No Plan Strain Fracture Toughness of This Particulate Composite Material.