REPORT DOCUMENTATION PAGE

Form Approved OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	2. REPORT TYPE	3. DATES COVERED *(From - To)*
	Technical Papers	

4. TITLE AND SUBTITLE

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Air Force Research Laboratory (AFMC)
AFRL/PRS
5 Pollux Drive
Edwards AFB CA 93524-7048

8. PERFORMING ORGANIZATION REPORT

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

Air Force Research Laboratory (AFMC)
AFRL/PRS
5 Pollux Drive
Edwards AFB CA 93524-7048

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT

Approved for public release; distribution unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			Leilani Richardson
Unclassified	Unclassified	Unclassified	A		19b. TELEPHONE NUMBER *(include area code)* (661) 275-5015

2 items enclosed = 219 + 220

FILE

MEMORANDUM FOR PRS (In-House Publication)

FROM: PROI (STINFO) 10 September 2002

SUBJECT: Authorization for Release of Technical Information, Control Number: **AFRL-PR-ED-VG-2002-219**
C.T. Liu (PRSM) et al., "Investigating the Effects of Pressure on the Near Tip Behavior and Crack Growth in a Particulate Composite Material" (viewgraphs only)

Int'l Conf on Damage & Fracture Mechanics 2002 **(Statement A)**
(Maui, HI, 15-17 October 2002) (Deadline: 11-Oct-02)

Investigating the Effects of Pressure on the near Tip Behavior and Crack Growth in a Particulate Composite Material

C.T.Liu[1] & M. Tam[2]

[1] Propulsion Directorate, U.S. Air Force Research Laboratory, U.S.A.

[2]The Aerospace Co. U.S.A.

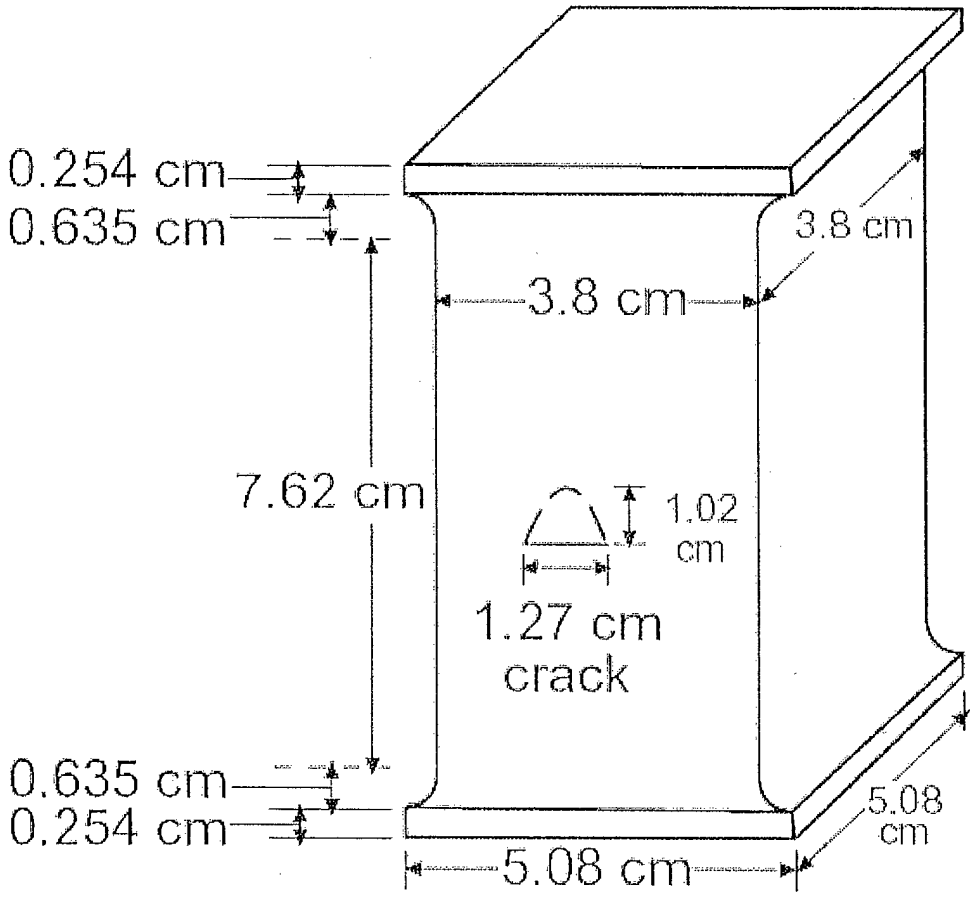
Objectives

- **Investigate the Effects of Confining Pressure and Loading History on the Near Tip Behavior and Crack Growth in a Particulate Composite Material.**

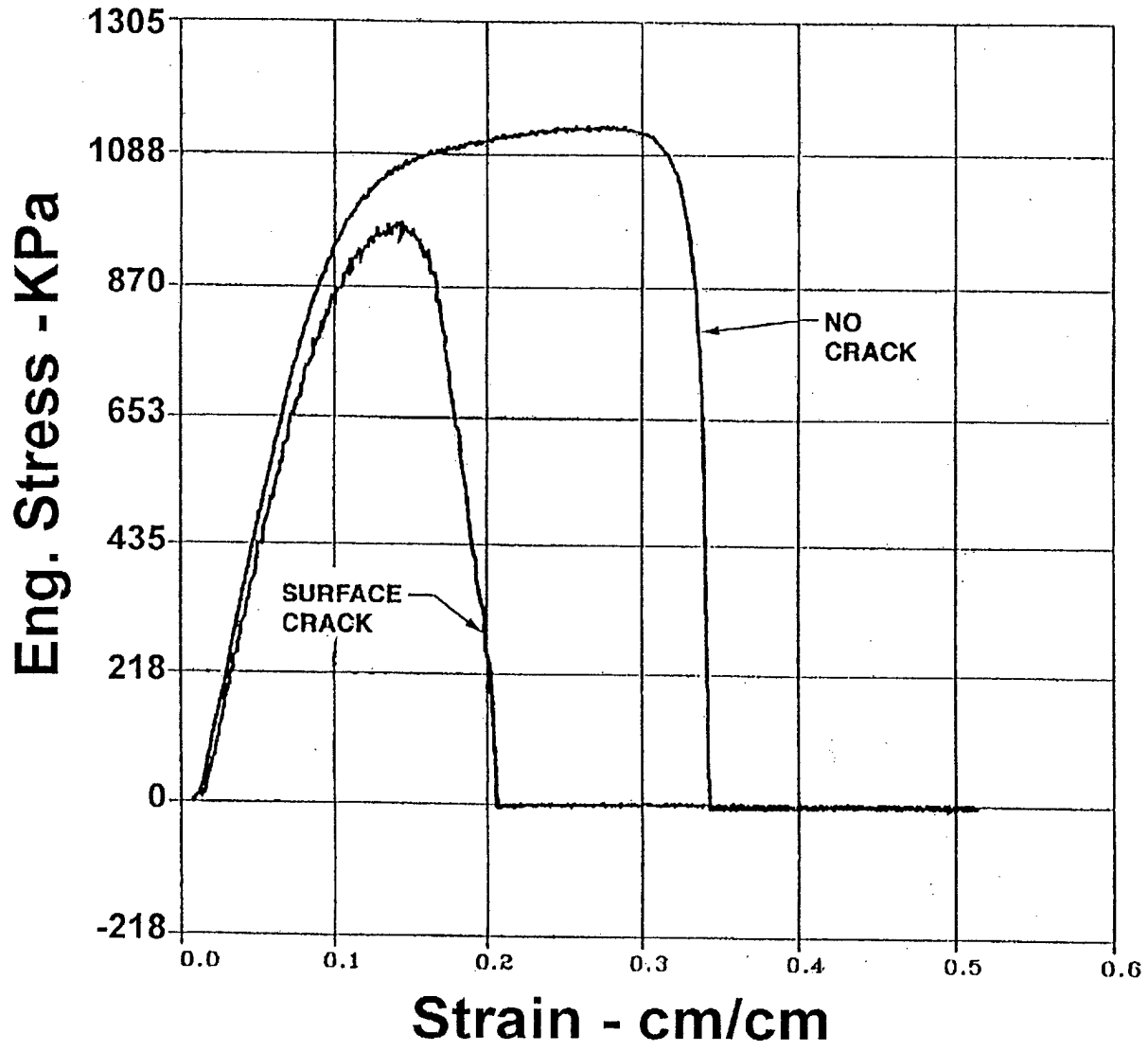
- **Confining Pressure:**
  - **Ambient and 8697 KPa**

- **Loading History:**
  - **Constant Strain Rate (5.8 cm/cm/min)**
  - **Constant Strain (18%)**

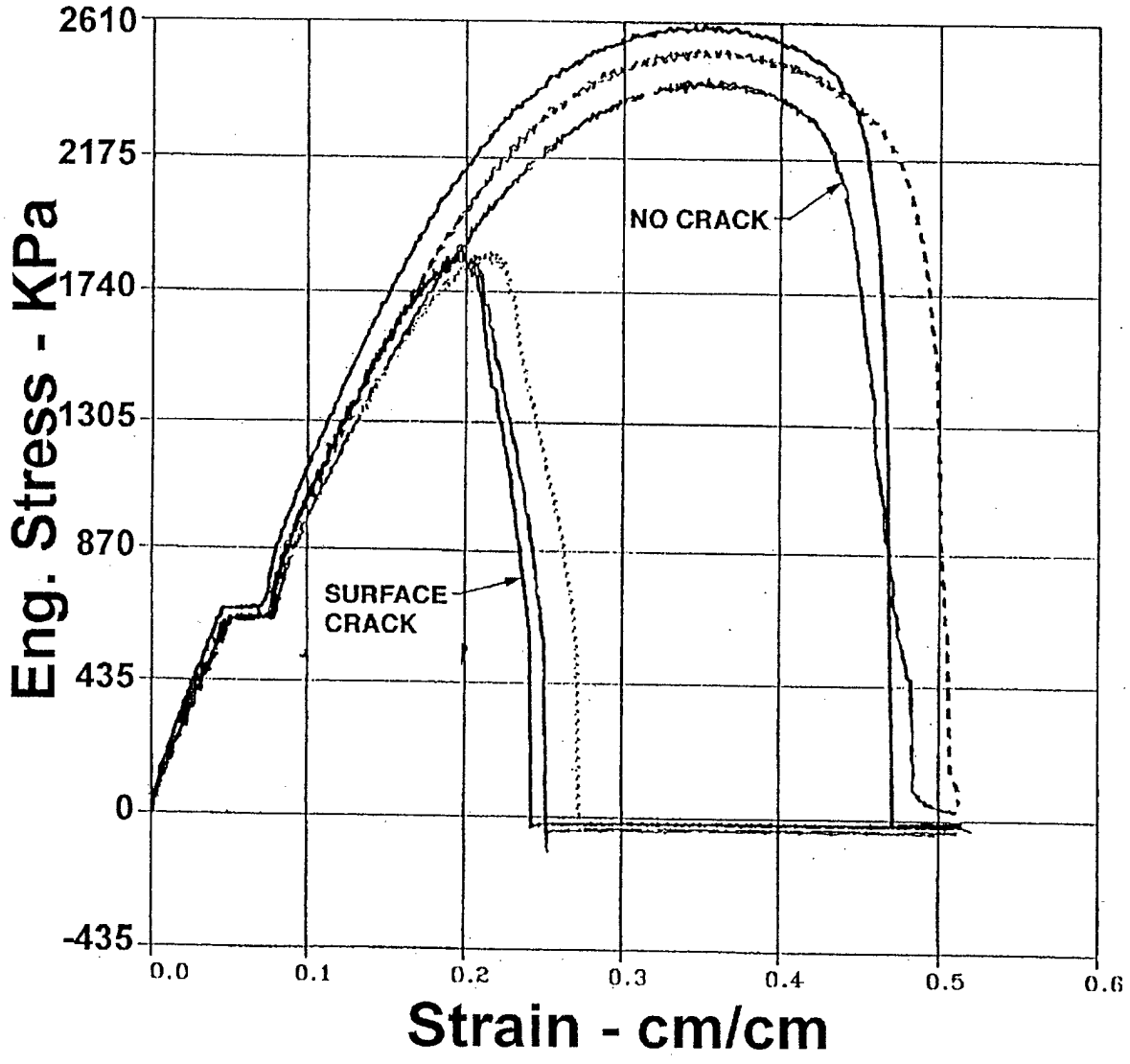
Specimen Geometry



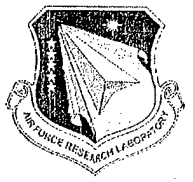
Engineering Stress Vs. Strain (Ambient Pressure)

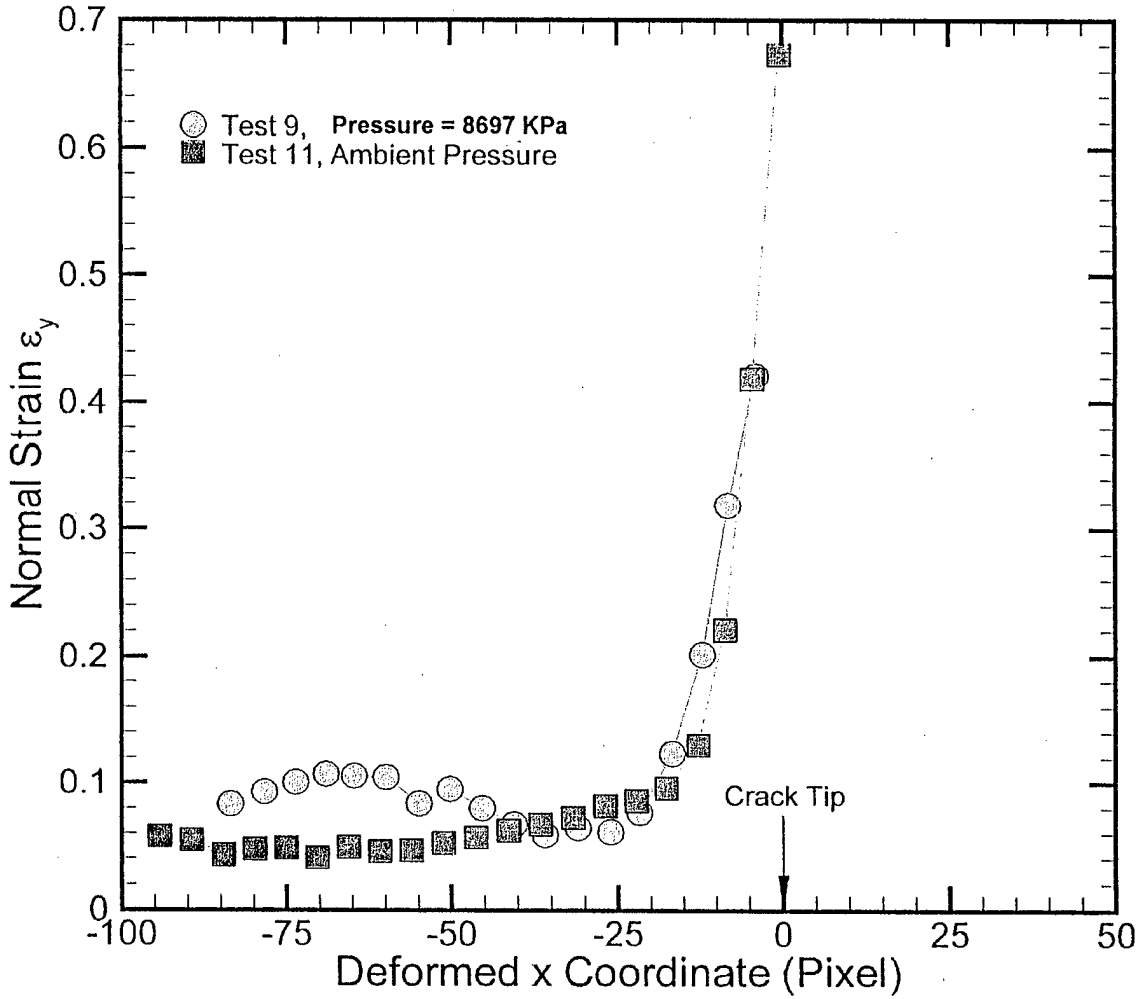


Engineering Stress Vs. Strain (8697 Kpa Presure)



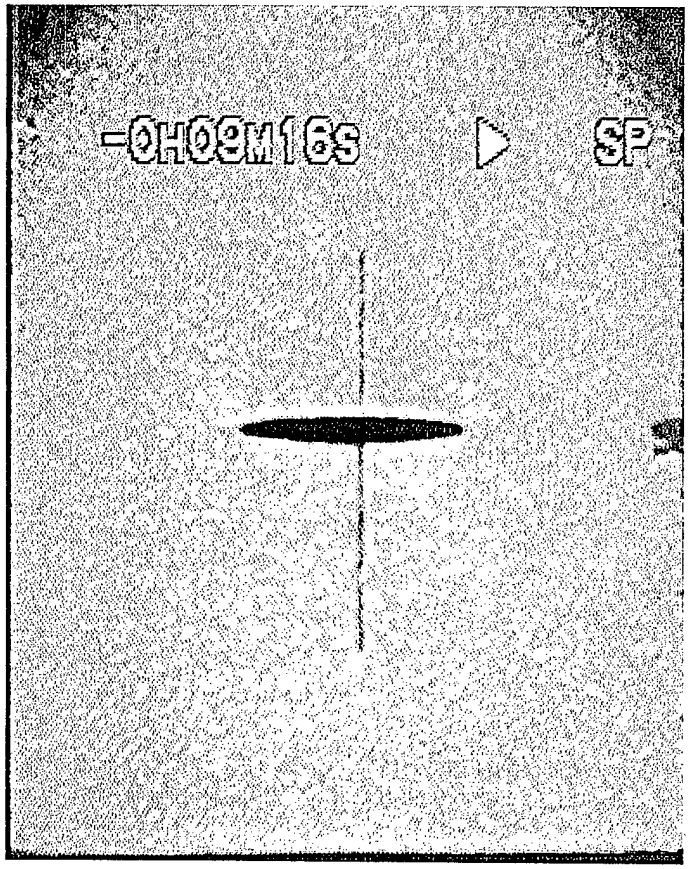
Normal Strain Distribution Ahead of the Crack Tip at the Onset of Crack Growth



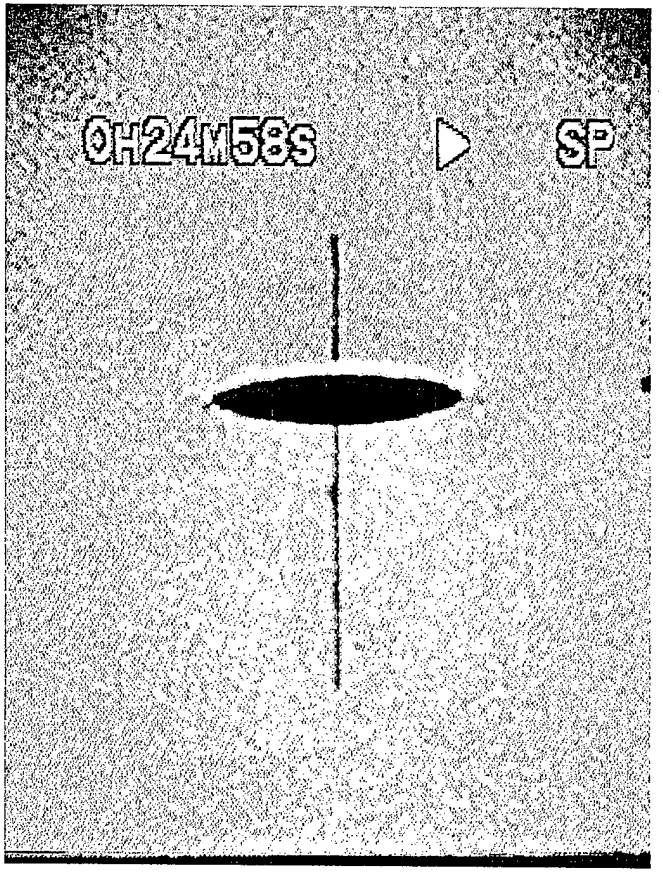


A2472.ppt

Crack Profiles at the Onset of Crack Growth



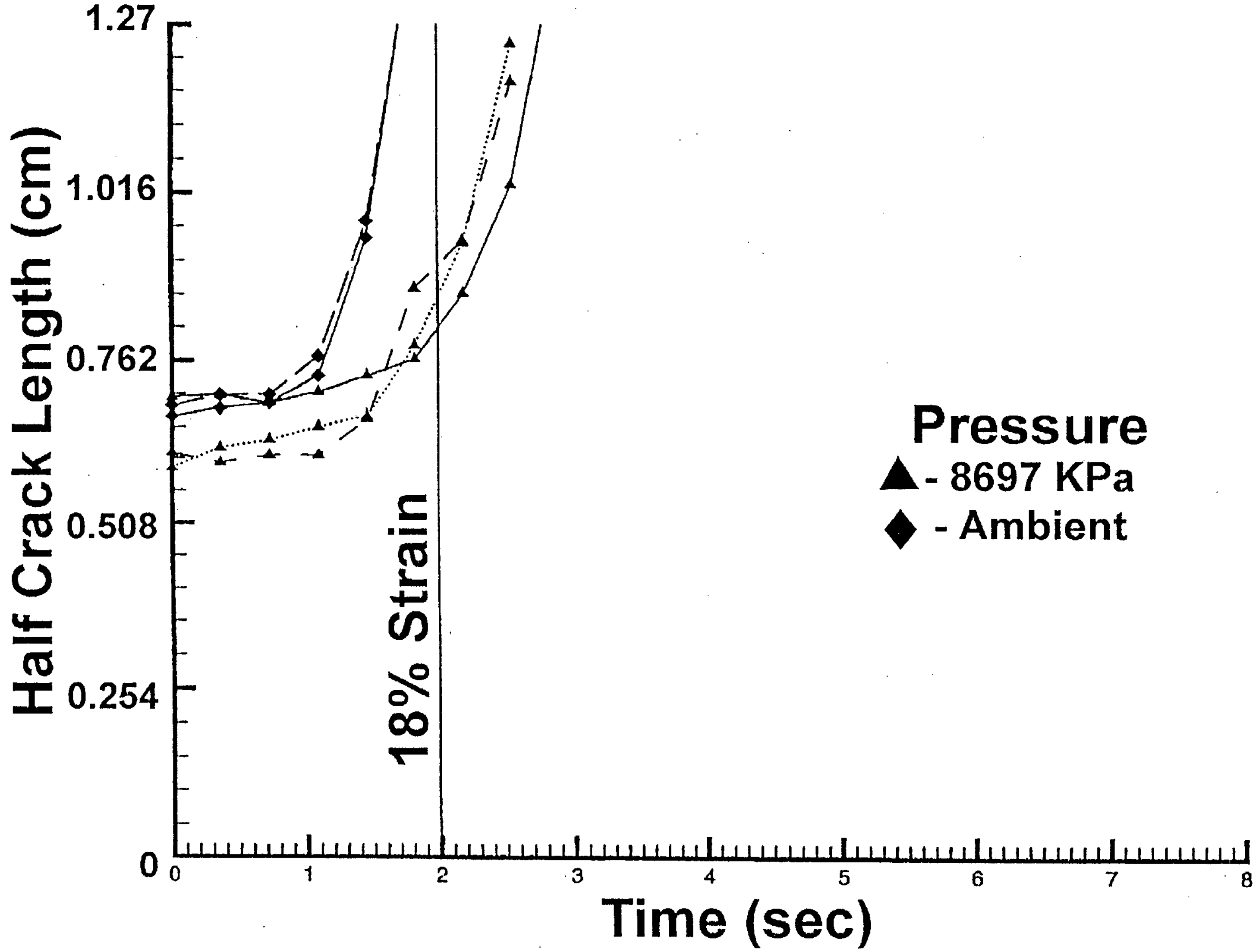
ambient pressure



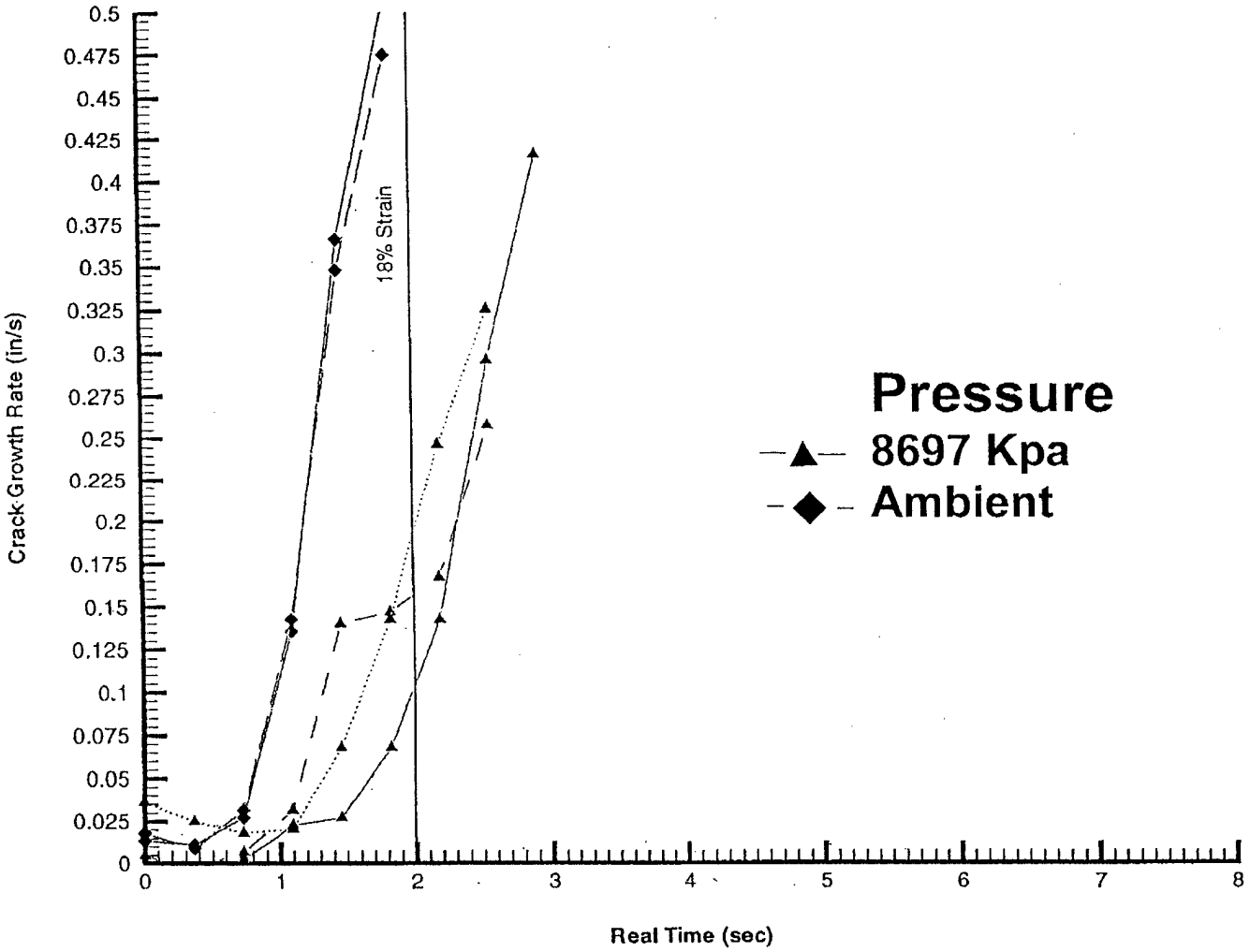
8697 Kpa confining pressure

A2472.ppt

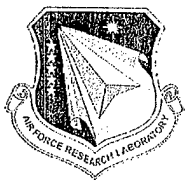
Half Crack Length Vs. Time (Constant Strain Rate Condition)

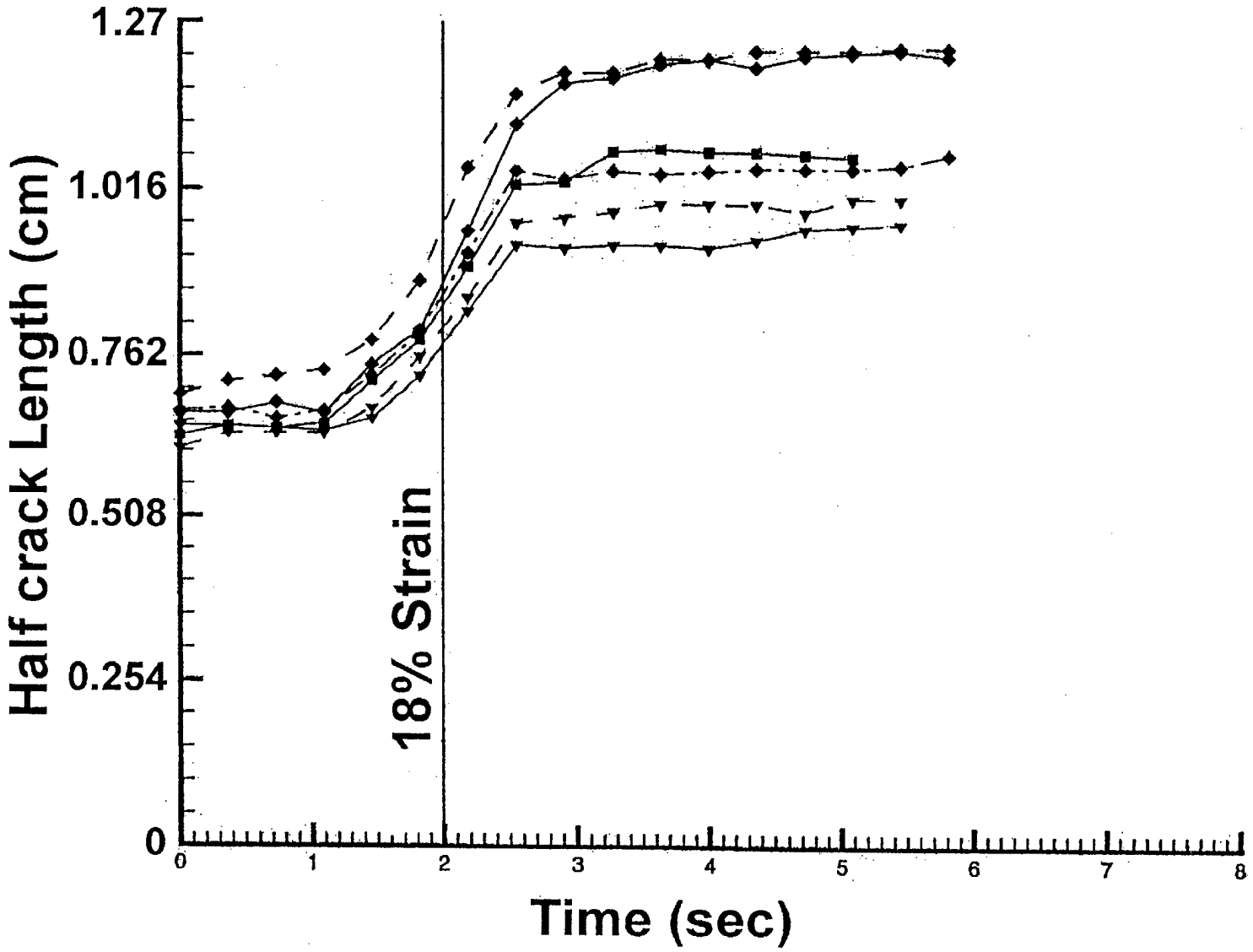


Crack Growth Rate Vs. Time (Constant Strain Rate Condition)



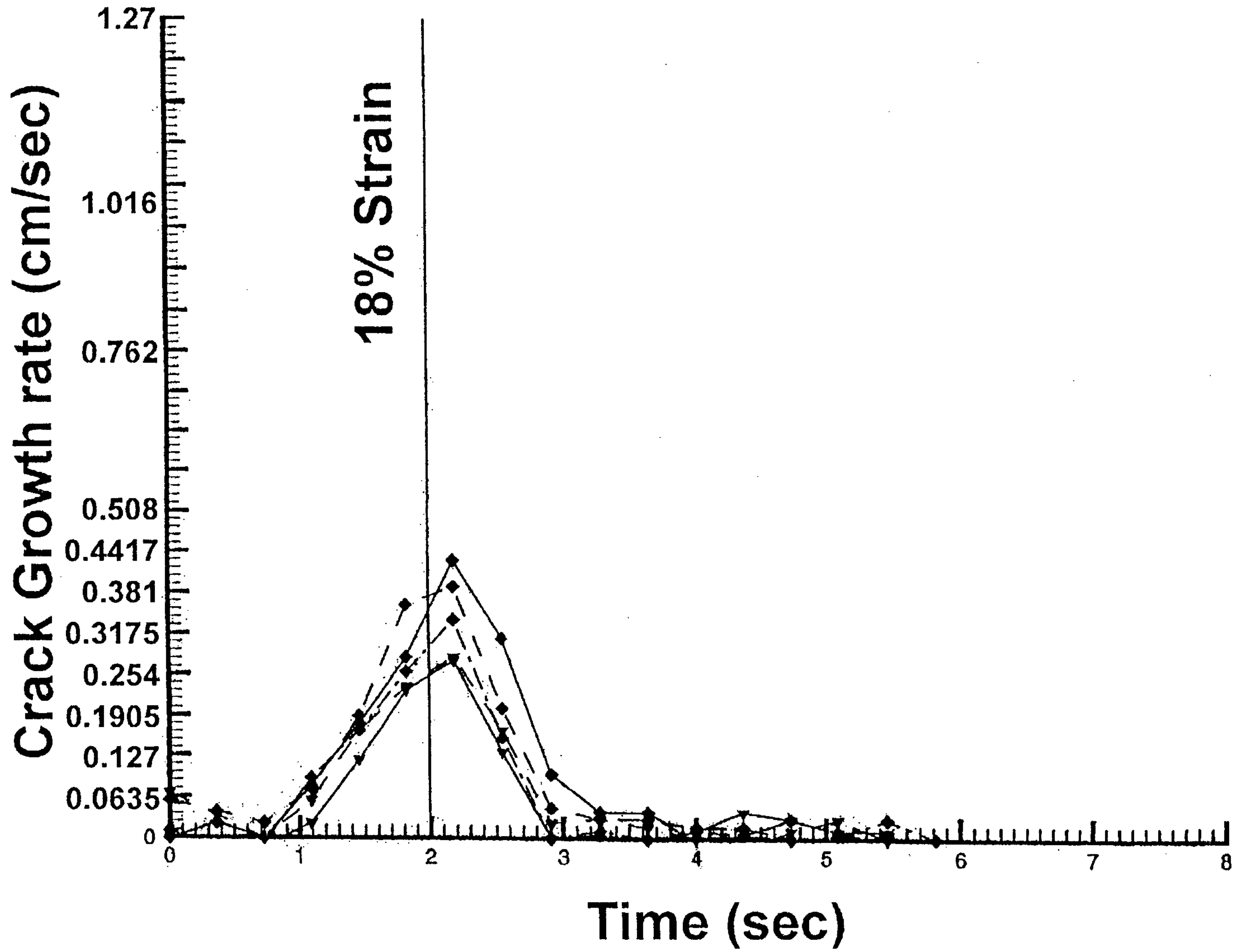
Half Crack Length Vs. Time (Constant Strain Condition)





A2472.ppt

Crack Growth Rate Vs. Time (Constant Strain Condition)



Conclusions

- The crack growth rate under ambient pressure is significantly higher than that under 8697 KPa confining pressure.
- At the onset of crack growth, the crack opening displacement under 8697 KPA confining pressure is greater than that under ambient pressure.
- At the onset of crack growth, confining pressure has no significant effect on the size of the high-strain zone.
- Under constant strain condition, the crack stops growing after it propagates a short distance.