

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

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1. REPORT DATE (DD-MM-YYYY)		2. REPORT TYPE Technical Papers		3. DATES COVERED (From - To)	
4. TITLE AND SUBTITLE				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER 2302	
				5e. TASK NUMBER MIG 2	
				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 A	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON Leilani Richardson
a. REPORT Unclassified	b. ABSTRACT Unclassified	c. THIS PAGE Unclassified			19b. TELEPHONE NUMBER (include area code) (661) 275-5015

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std. Z39.18

36 separate files are enclosed

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MEMORANDUM FOR PRS (Contractor/In-House Publication)

FROM: PROI (TI) (STINFO)

24 August 1999

SUBJECT: Authorization for Release of Technical Information, Control Number: AFRL-PR-ED-TP-FY99-0171
C.T. Liu, "Application of Real-Time X-Ray Technique to Monitor Damage Process in a Particulate Filled Composite"

Presentation at International Conference

(Statement A)

~~Distribution~~



Application of Real-Time X-Ray Technique to Monitor Damage Process in a Particulate Filled Elastomer

C.T. Liu

Air Force Research Laboratory

Edwards AFB, CA 93524-7680

20021119 126



Objectives

- Investigate Damage Initiation and Evolution Processes Using Real-Time X-Ray Techniques.
- Investigate the Effect of Damage on Crack Growth Behavior.



Local Dewetting About Filler Particles in Propellant

A2598

← Direction of Strain →



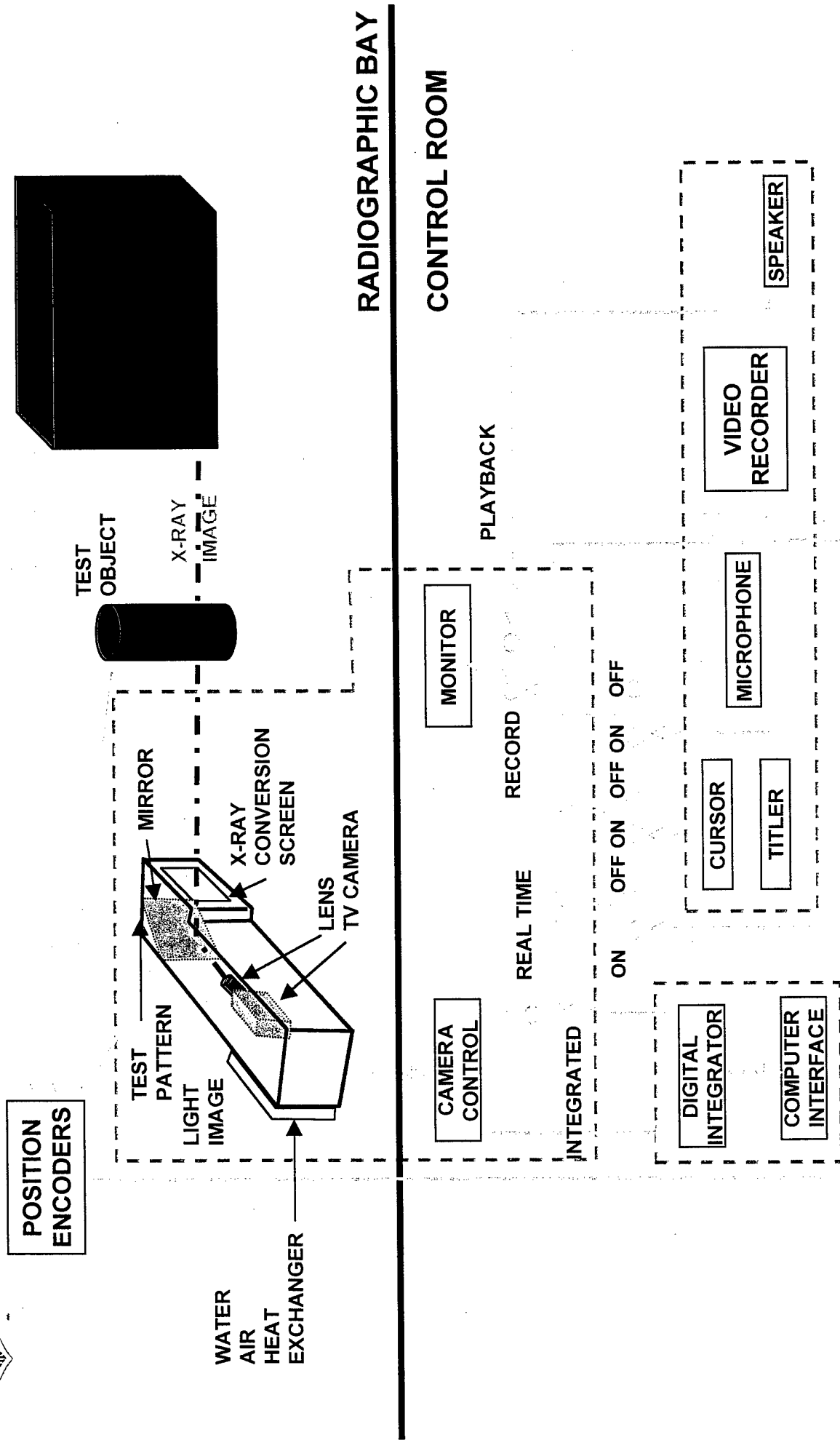
Unstrained



30% Strain

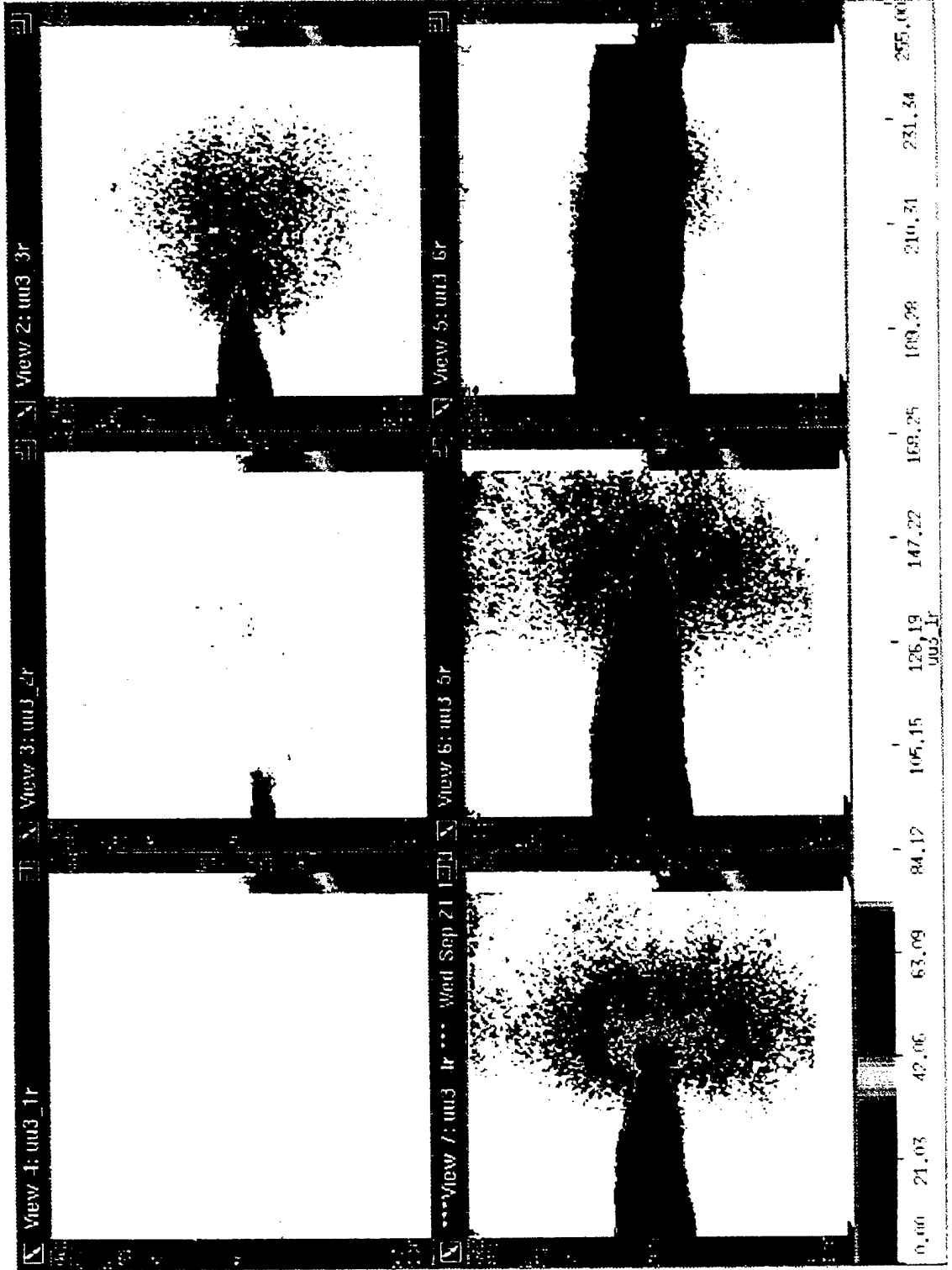


Block Diagram of a Real-Time Radiographic System

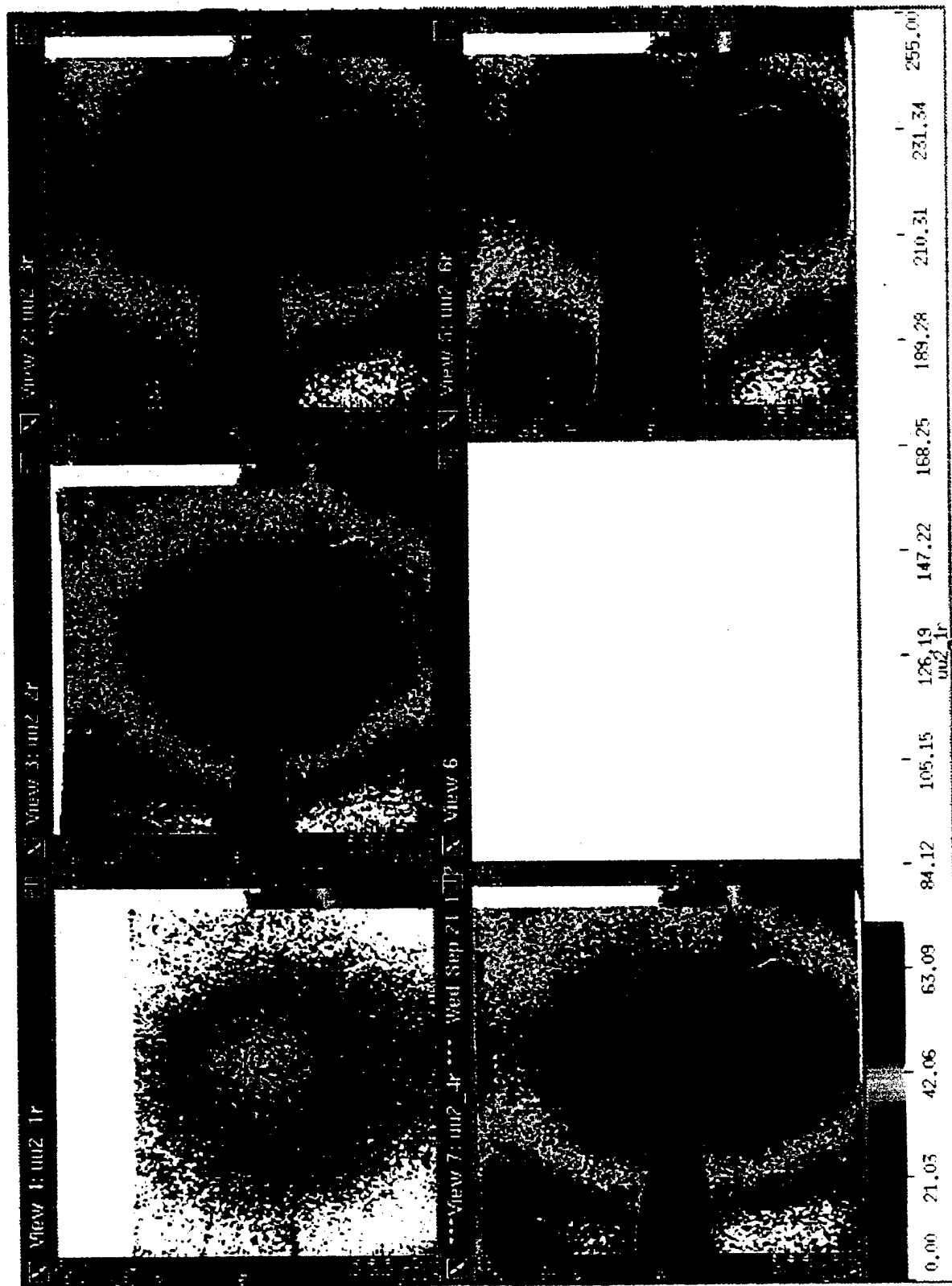




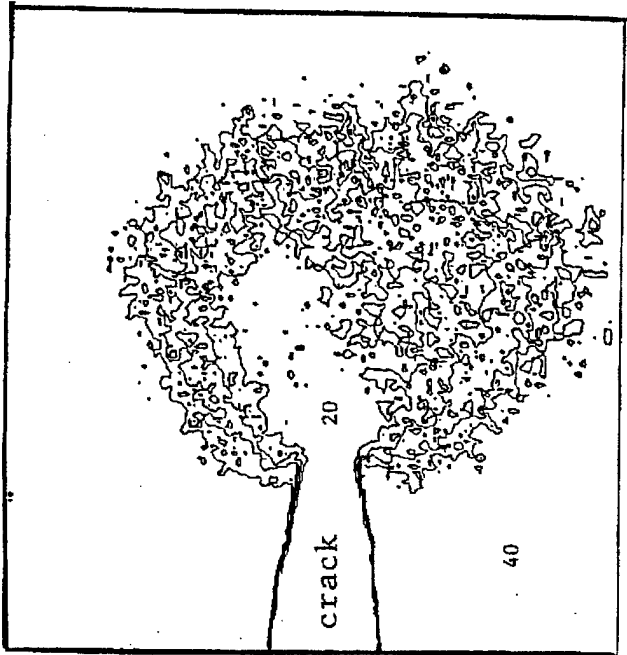
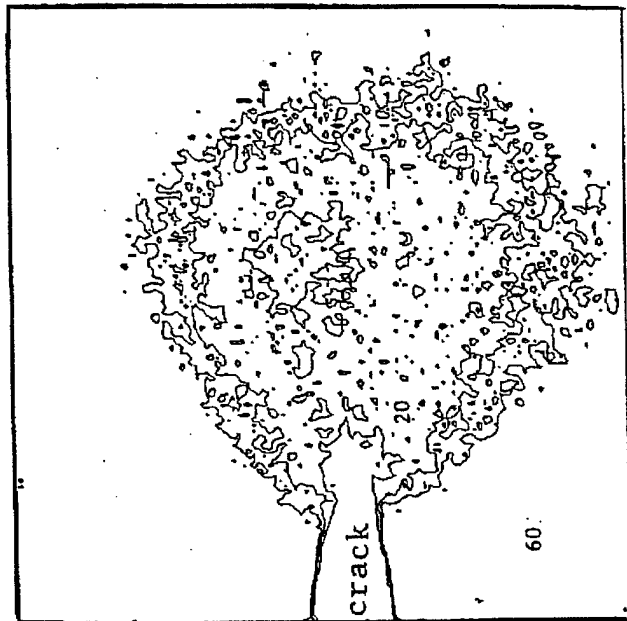
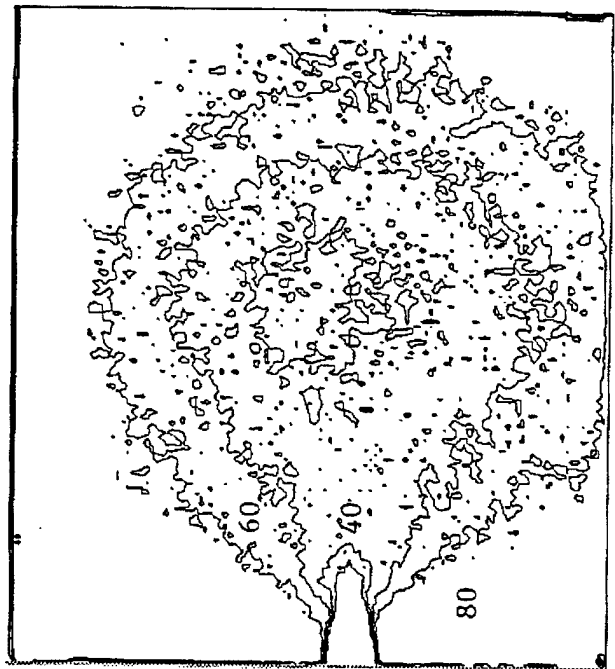
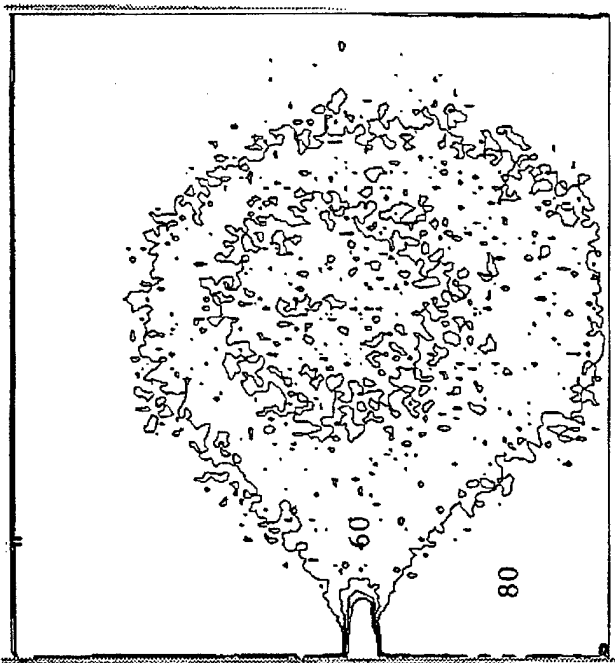
Specimen 7



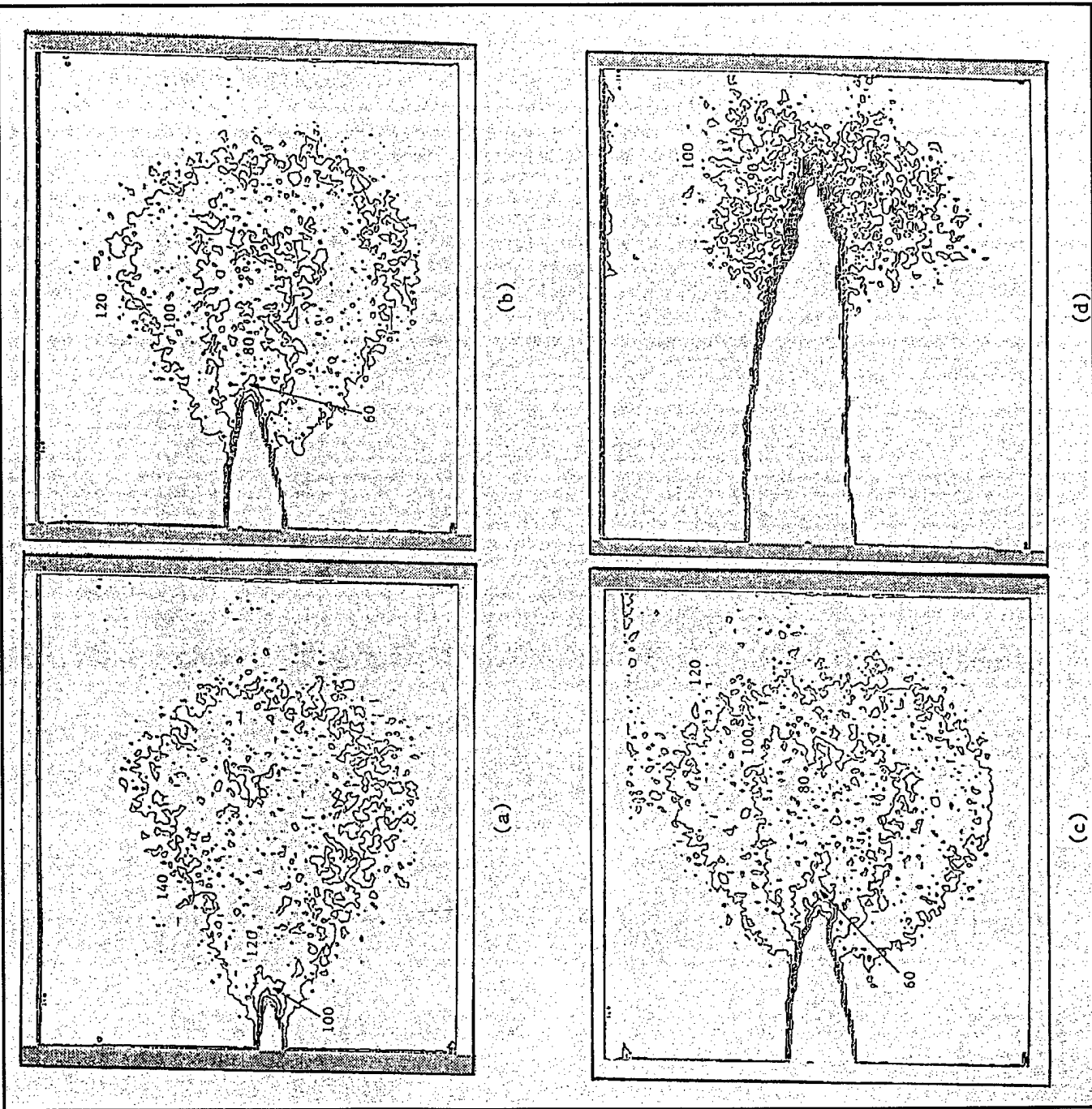
Specimen 6



Iso-Intensity Contour Plots of I_t Near Crack Tip

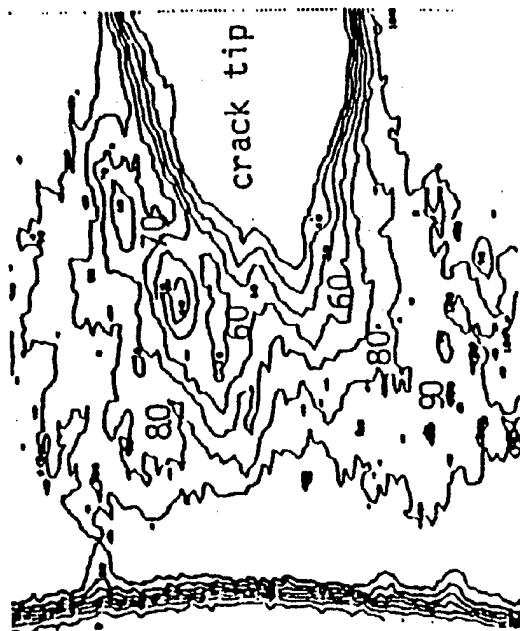


Iso-Intensity Contour Plots of I_t Near Crack Tip

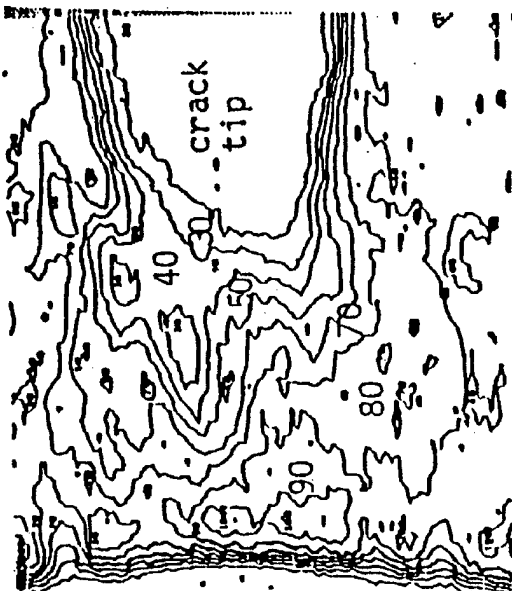




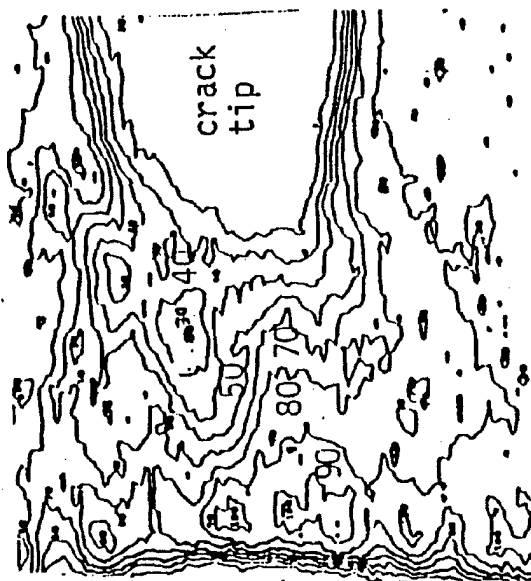
Iso-Intensity Contour Plots of I_t Near Crack Tip



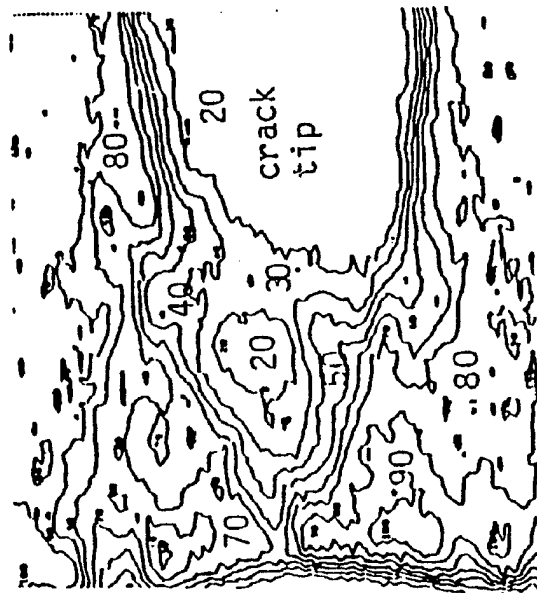
(e) $\epsilon = 13.5\%$



(f) $\epsilon = 13.5\%$



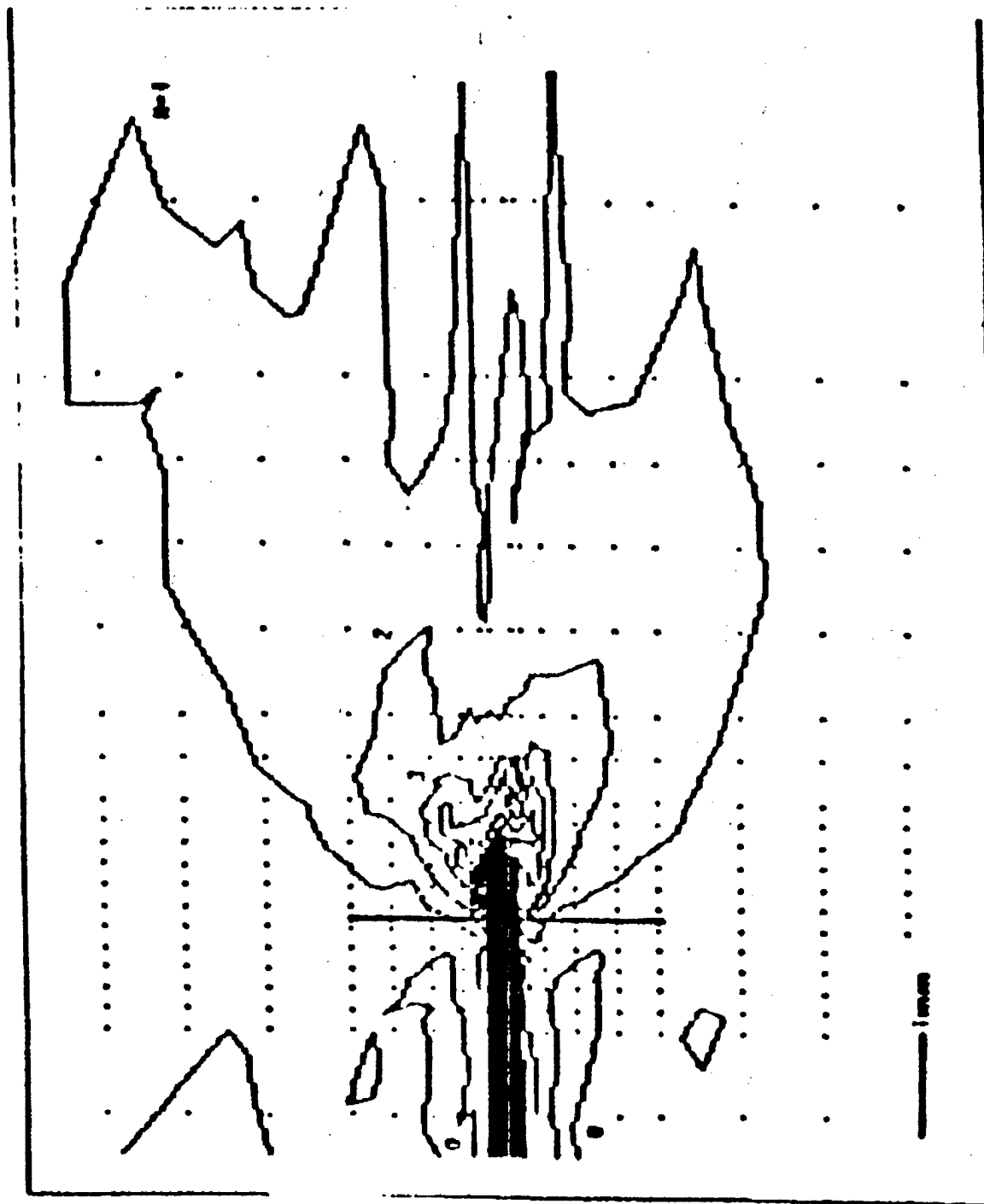
(g) $\epsilon = 13.5\%$

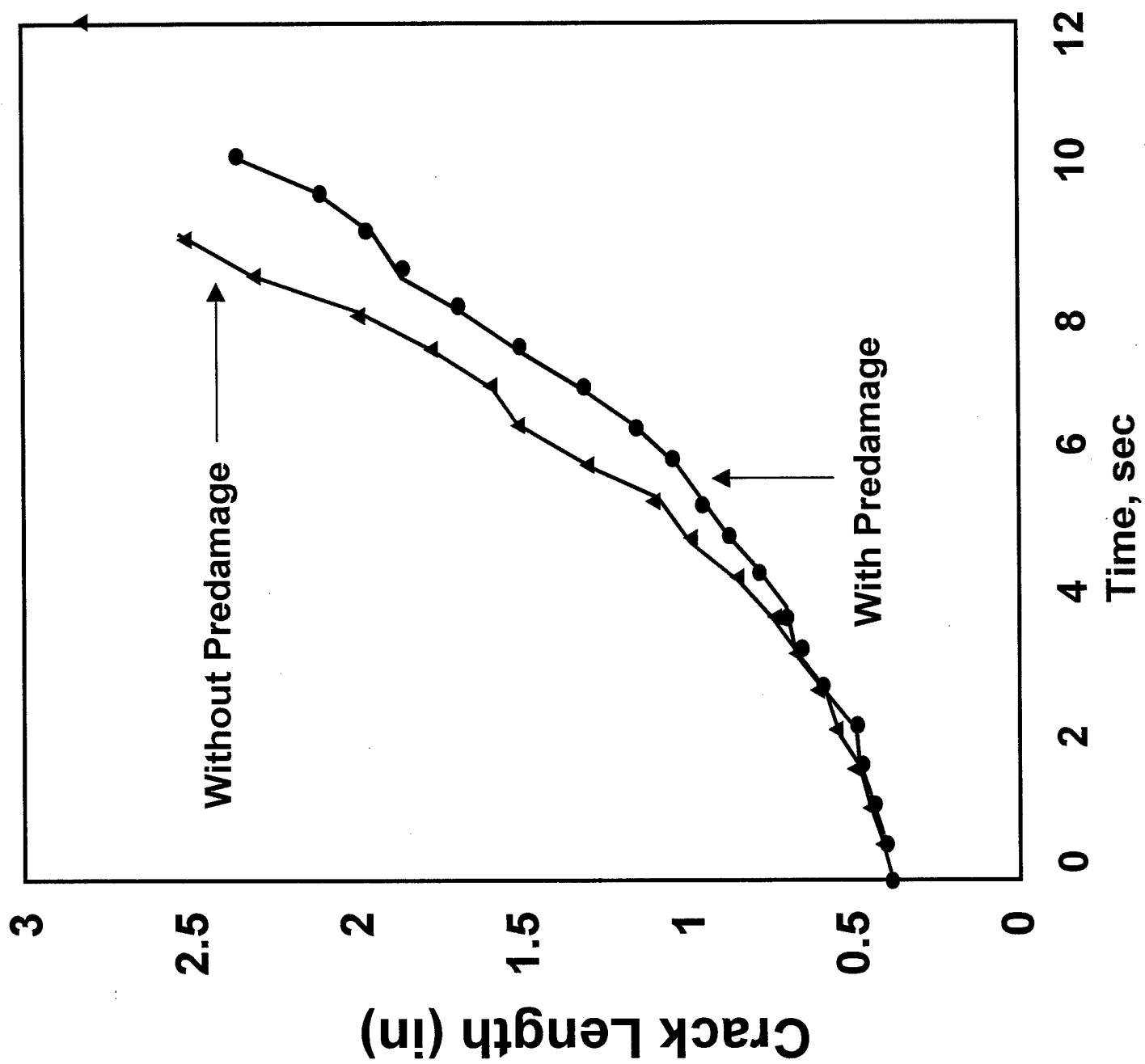


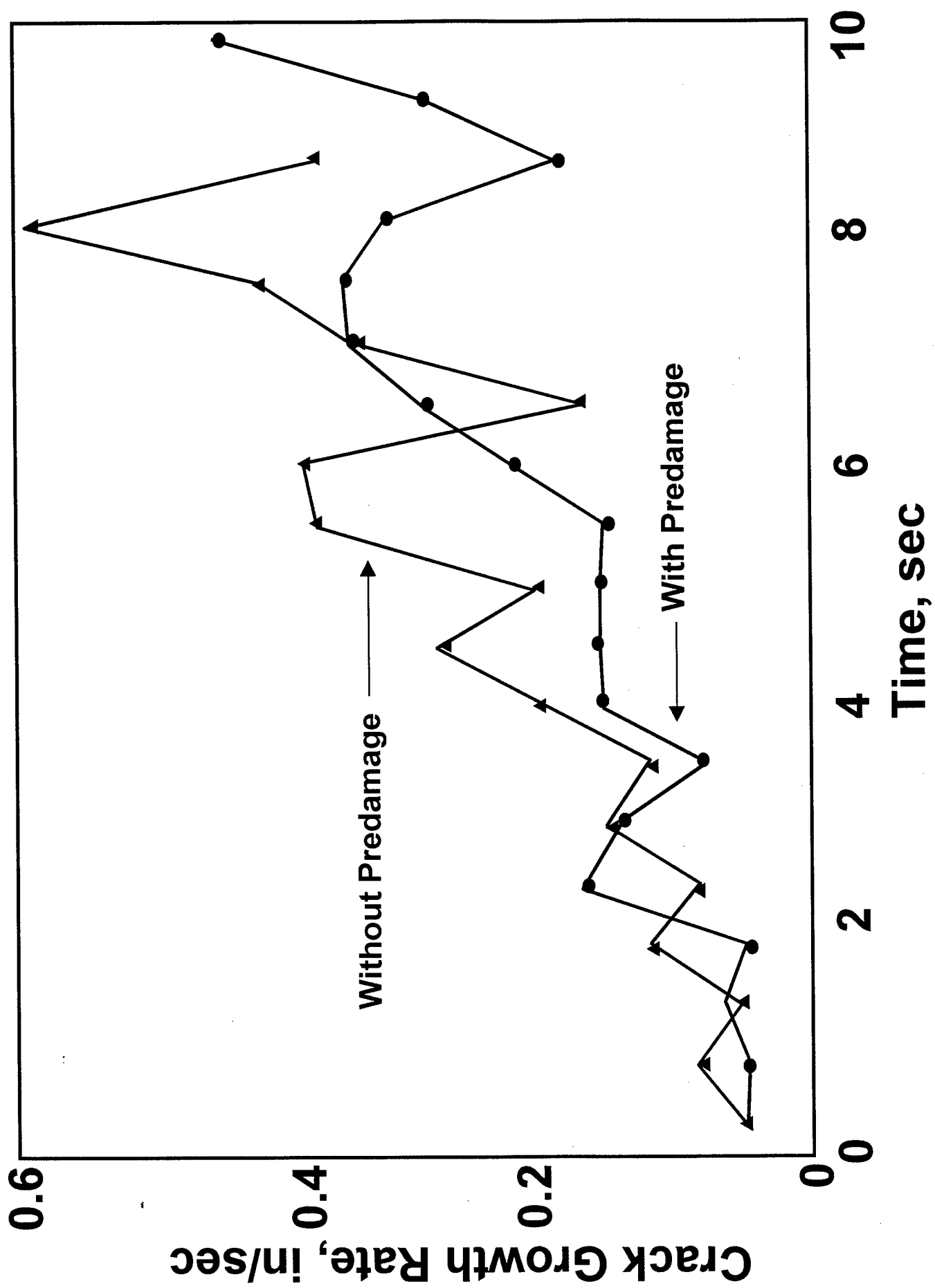
(h) $\epsilon = 13.5\%$



Normal Strain (Experimental Result)









Conclusions

- Under a Constant Strain Rate Loading Condition, Damage Zone Size and Intensity of Damage Increase with Increasing Time.
- Pre-Damage does Affect the Crack Growth Behavior.
- The Damage Distribution is Roughly Commensurate with the Strain Distribution in the Specimen.
- The Real-Time X-Ray Technique is a Promising Technique to Monitor Damage Initiation and Evolution Processes in the Material.