

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

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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)	
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a. REPORT	b. ABSTRACT	c. THIS PAGE			Leilani Richardson
Unclassified	Unclassified	Unclassified	A		19b. TELEPHONE NUMBER (include area code) (661) 275-5015

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

7 items enclosed

MEMORANDUM FOR PRS (In-House Publication)

FROM: PROI (STINFO)

12 July 2002

SUBJECT: Authorization for Release of Technical Information, Control Number: **AFRL-PR-ED-VG-2002-180**
C.T. Liu (PRSM), "Multi-Scale Strain Measurements of a Multi-Phase Material"

MESO 2002

(Statement A)

(Aalborg, Denmark, 26-30 August 2002) (Deadline: 21 Aug 02)

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 _____

2. This request has been reviewed by the Public Affairs Office for: a.) appropriateness for public release and/or b) possible higher headquarters review.

Comments: _____

Signature _____ Date _____

3. This request has been reviewed by the STINFO for: a.) changes if approved as amended, b) appropriateness of references, if applicable; and c.) format and completion of meeting clearance form if required

Comments: _____

Signature _____ Date _____

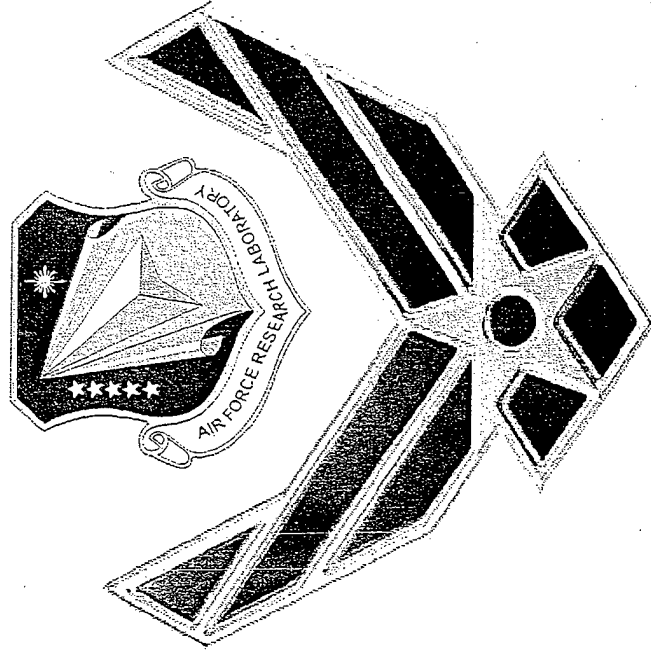
4. This request has been reviewed by PR for: a.) technical accuracy, b.) appropriateness for audience, c.) appropriateness of distribution statement, d.) technical sensitivity and economic sensitivity, e.) military/national critical technology, and f.) data rights and patentability

Comments: _____

APPROVED/APPROVED AS AMENDED/DISAPPROVED

PHILIP A. KESSEL Date
Technical Advisor
Space and Missile Propulsion Division

Multi-Scale Strain Measurements of a Multi-Phase Material

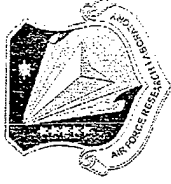


C. T. Liu
AFRL/PRSM

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Objectives

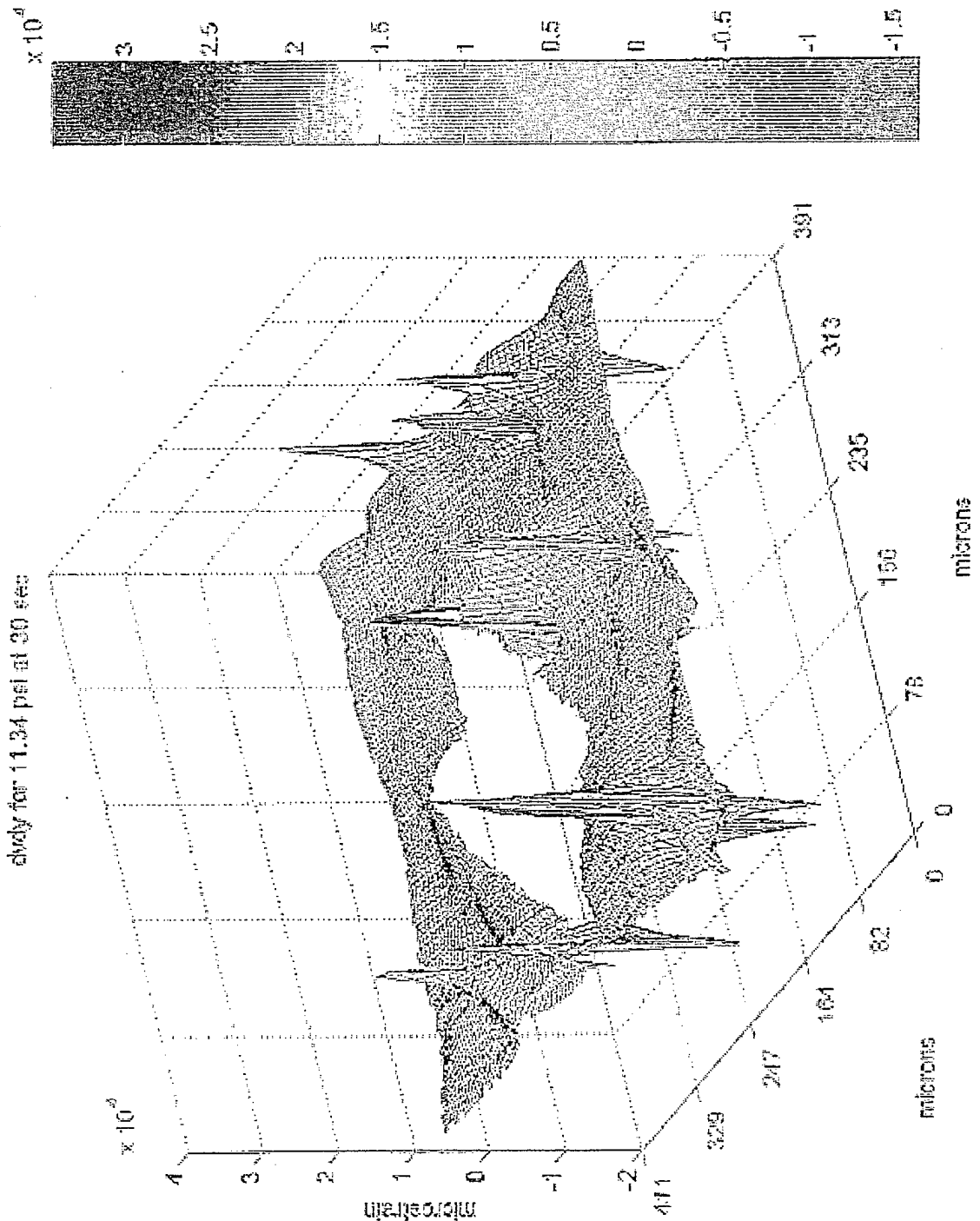


- ✚ Investigate the Effects of Time and the applied load on the Strain Distributions near a Filler Particle under Constant Load Conditions.
- ✚ Investigate the Effect of Microstructure on the Strain Distributions near a Crack Tip.
- ✚ Investigate the Damage and Crack Growth Mechanisms in the Material under a Constant Strain Rate Condition.



14 June 24/02 MESO

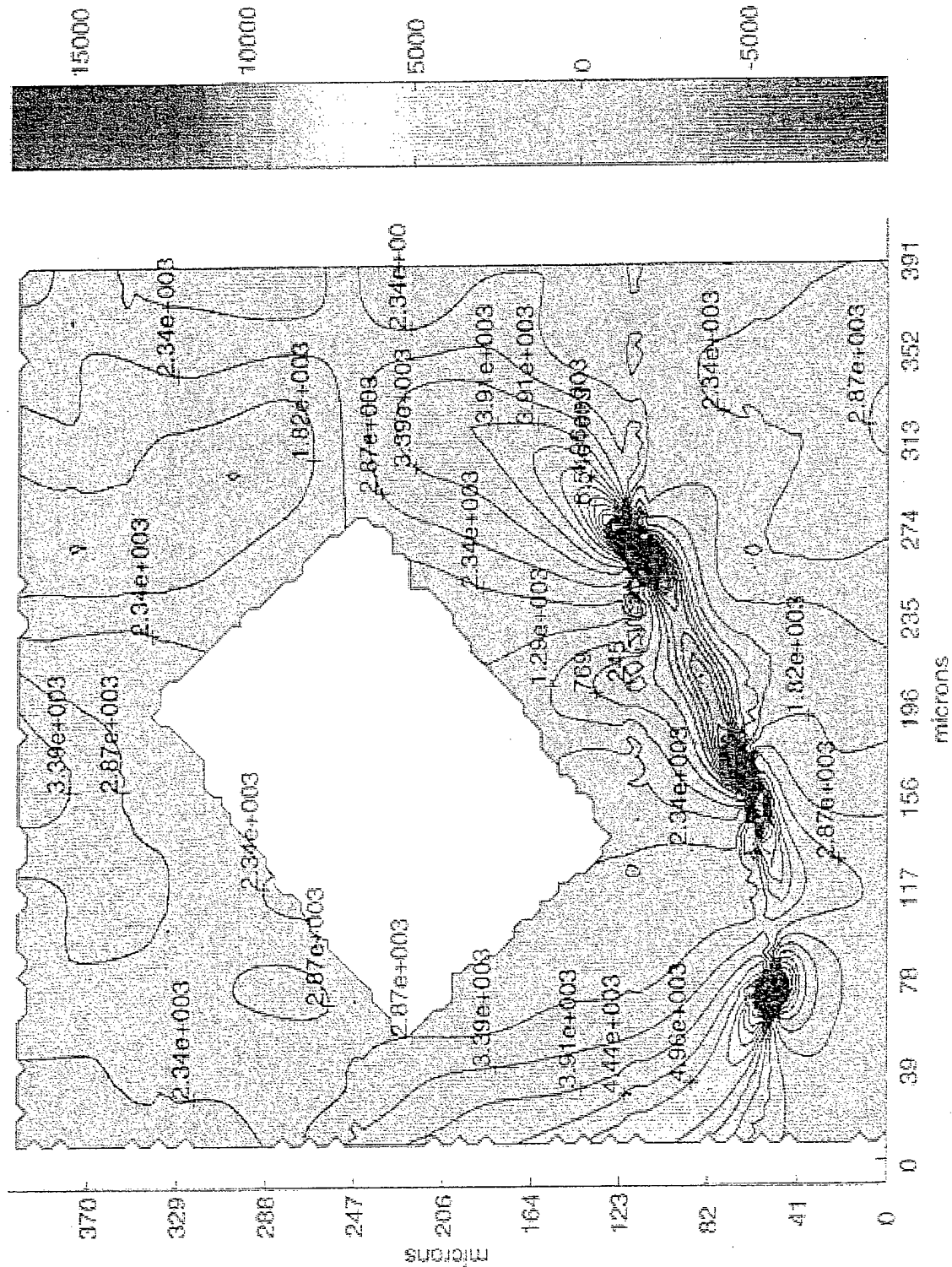
ϵ_y for 11.34 psi at 30 sec



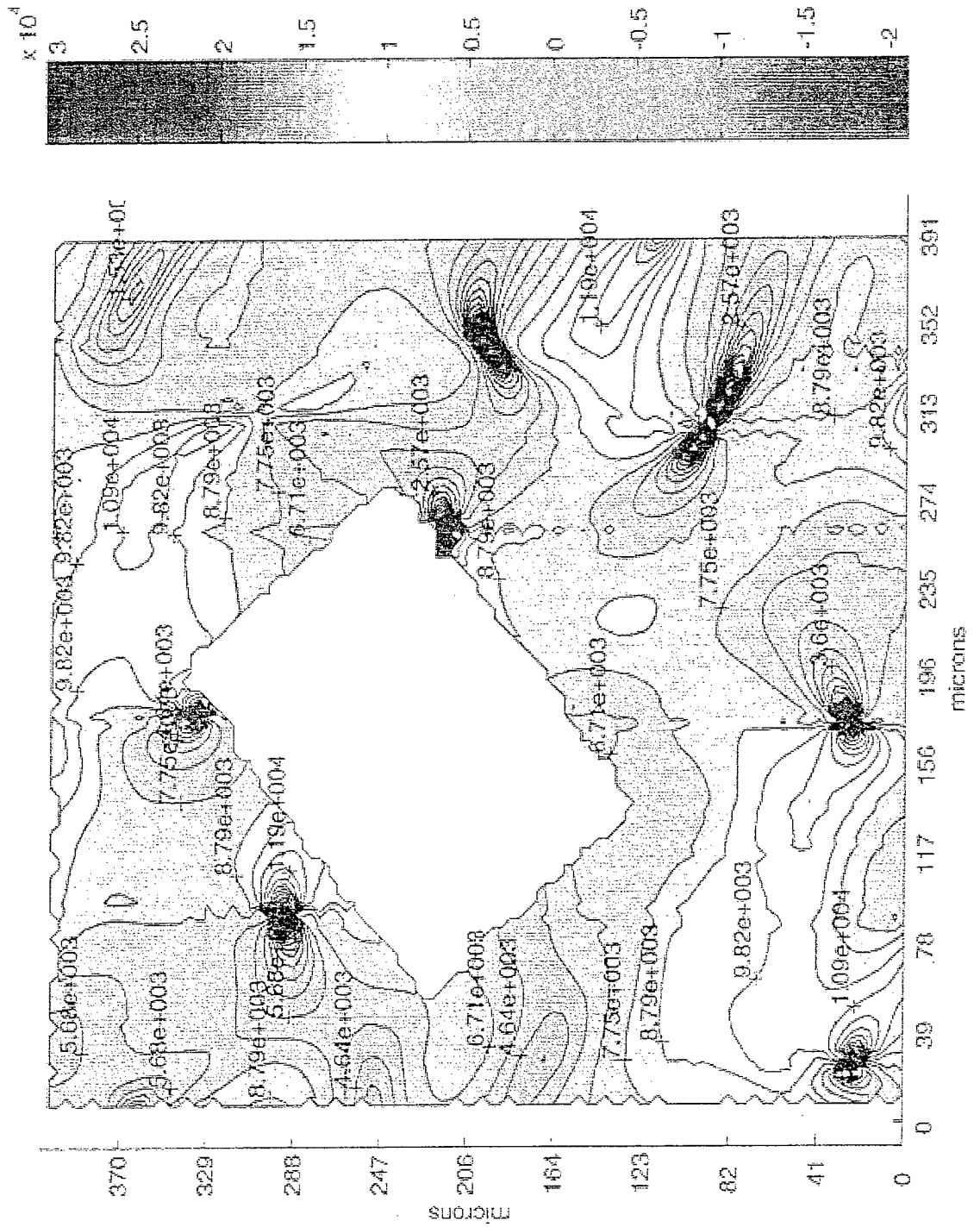


11/10/02 MESO

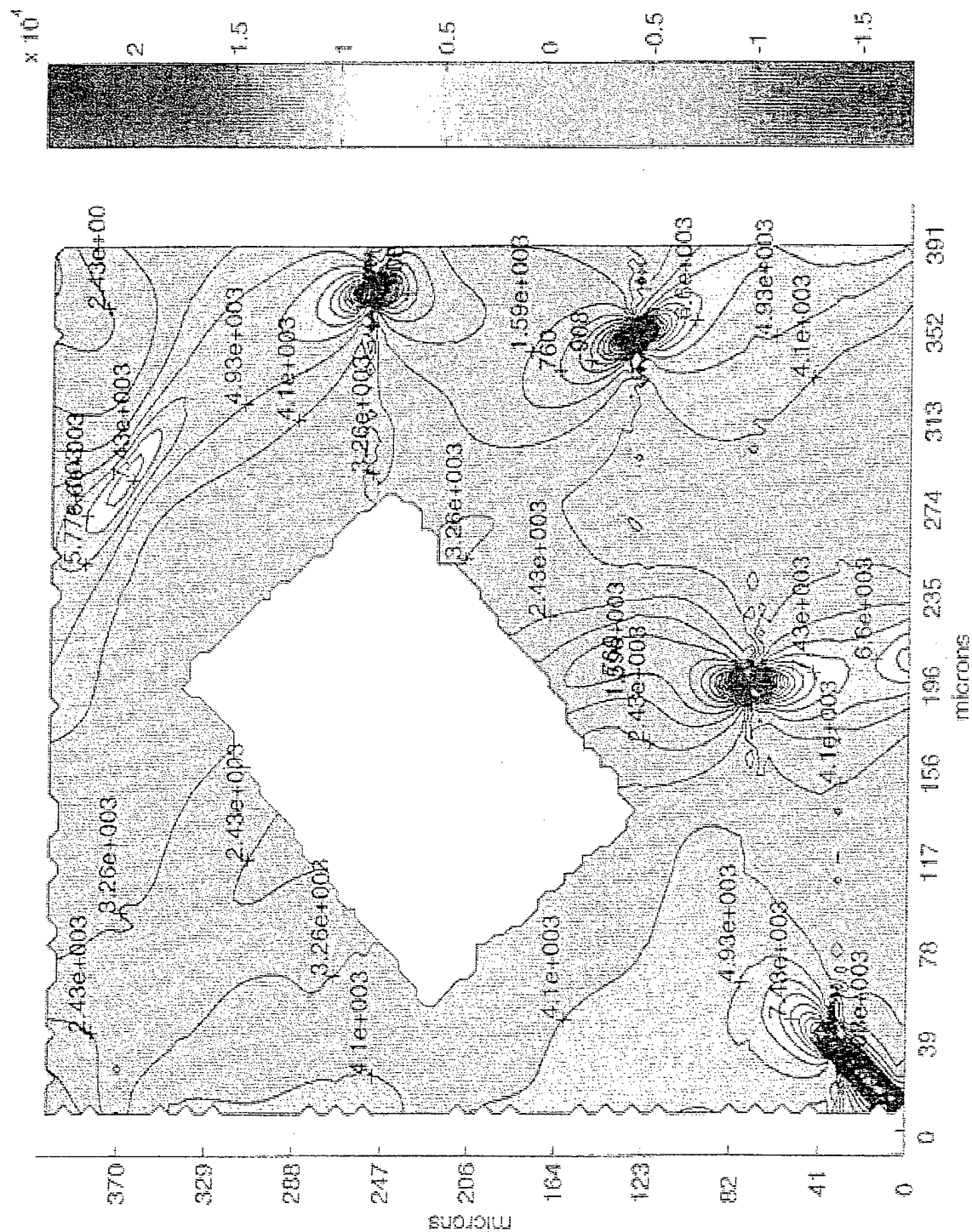
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ϵ_y for 11.34 psi at 30 min



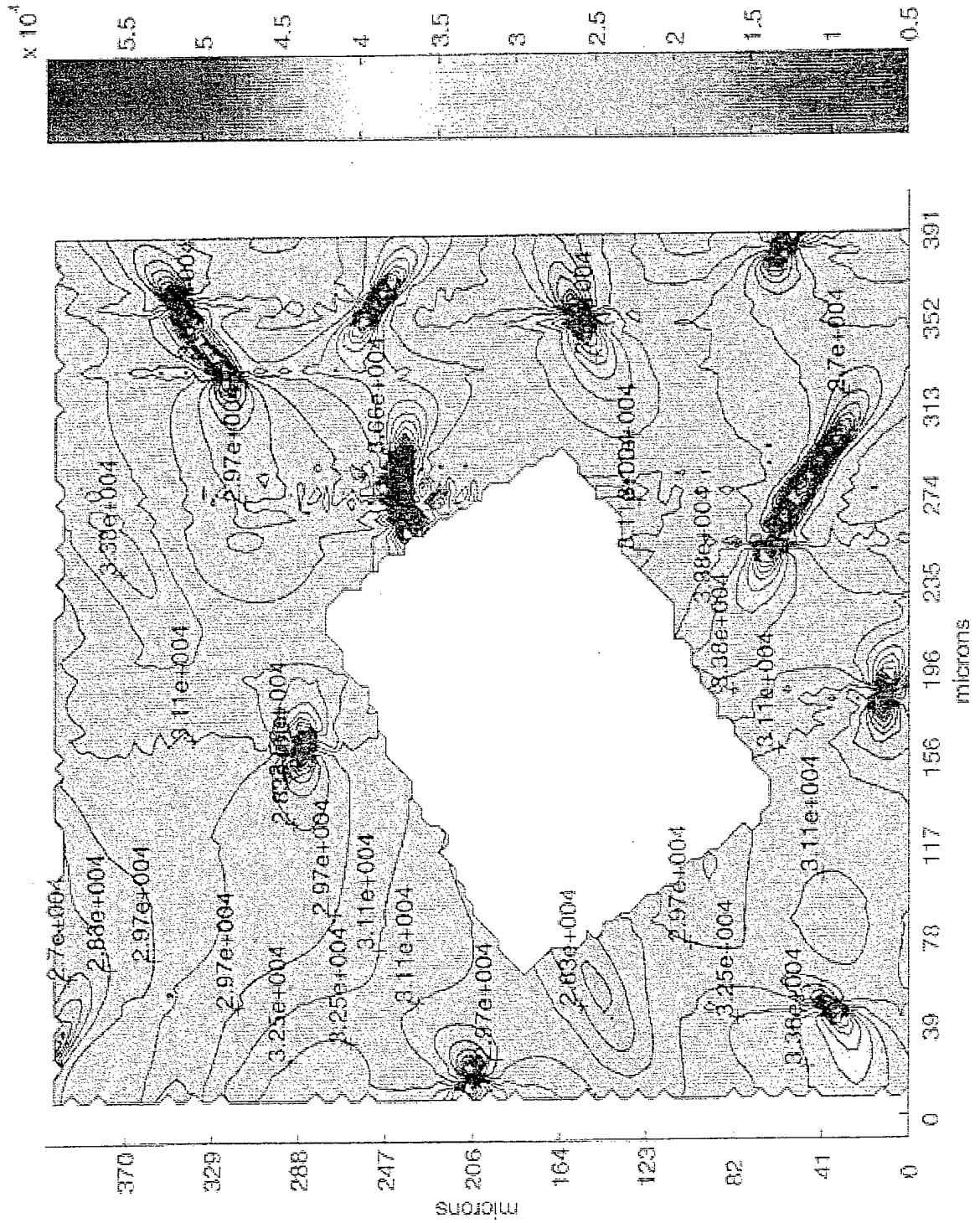
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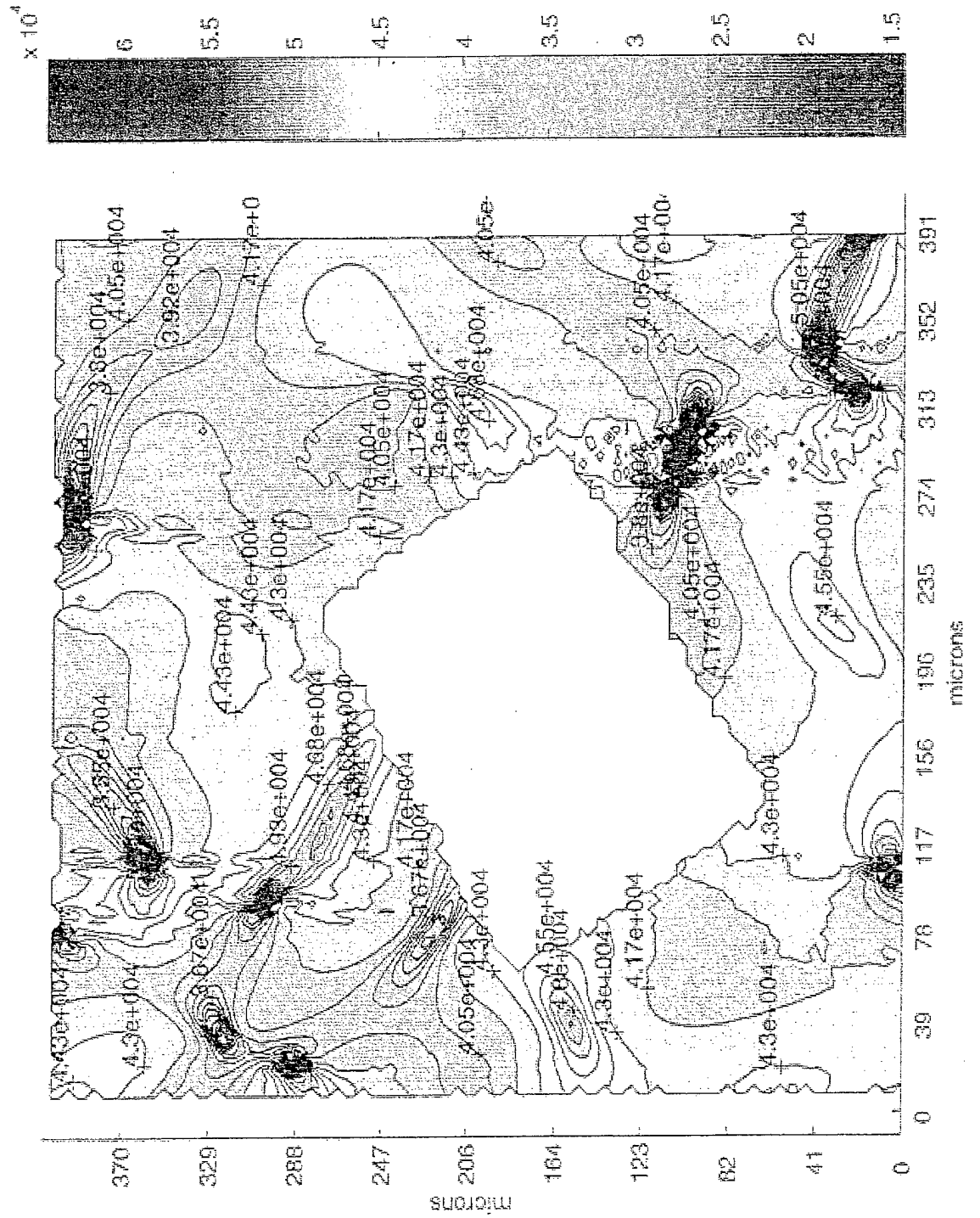


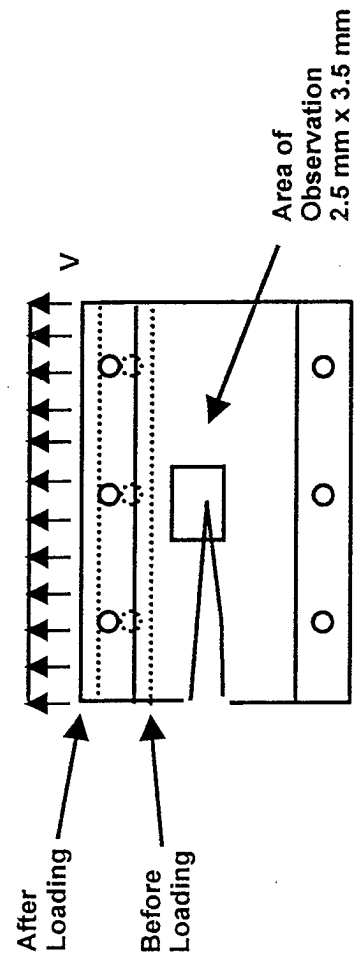
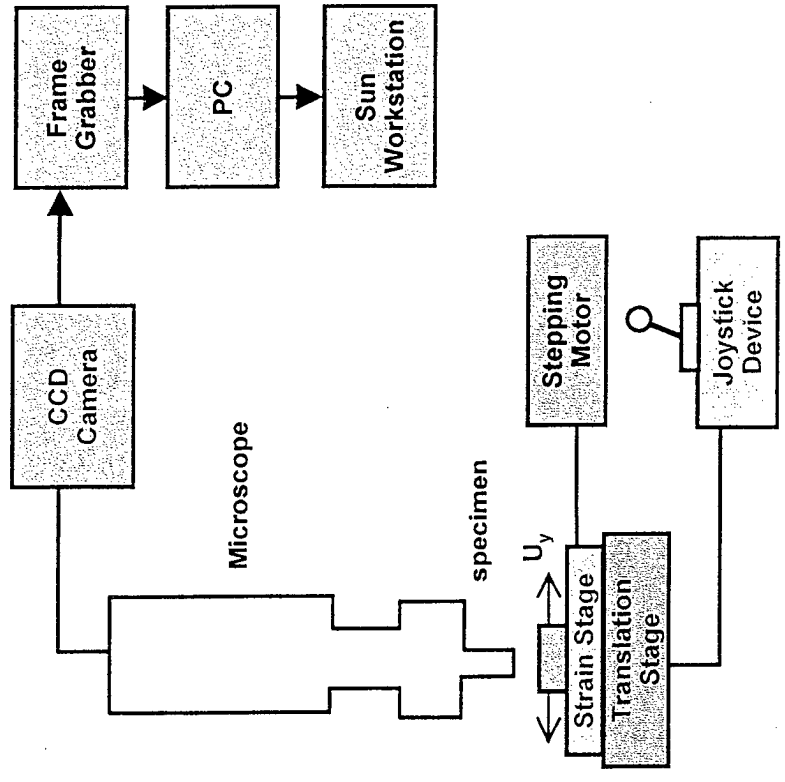
10 June 24/02 MESO

ϵ_y for 33.66 psi at 30 sec



ϵ_y for 33.66 psi at 30 min

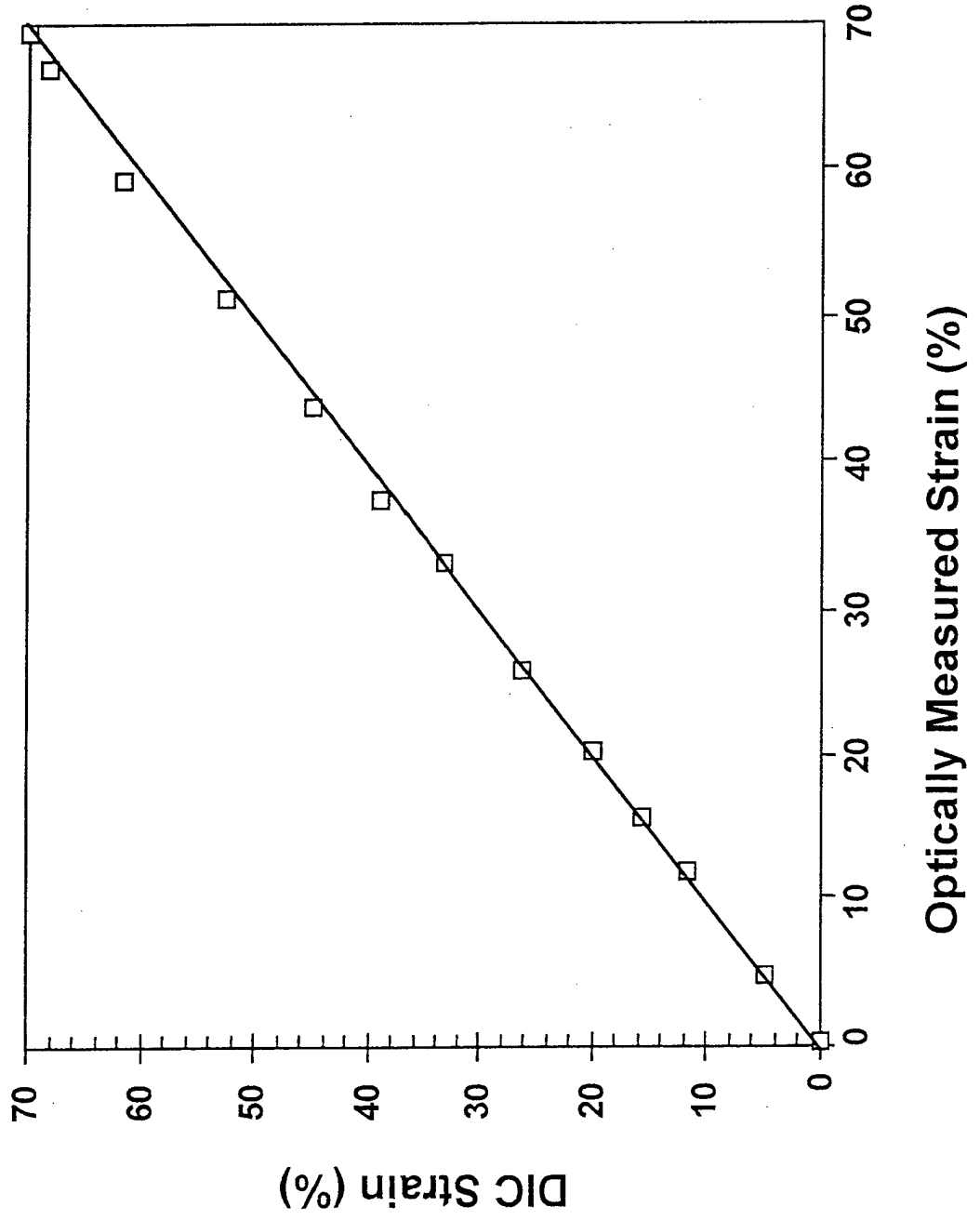






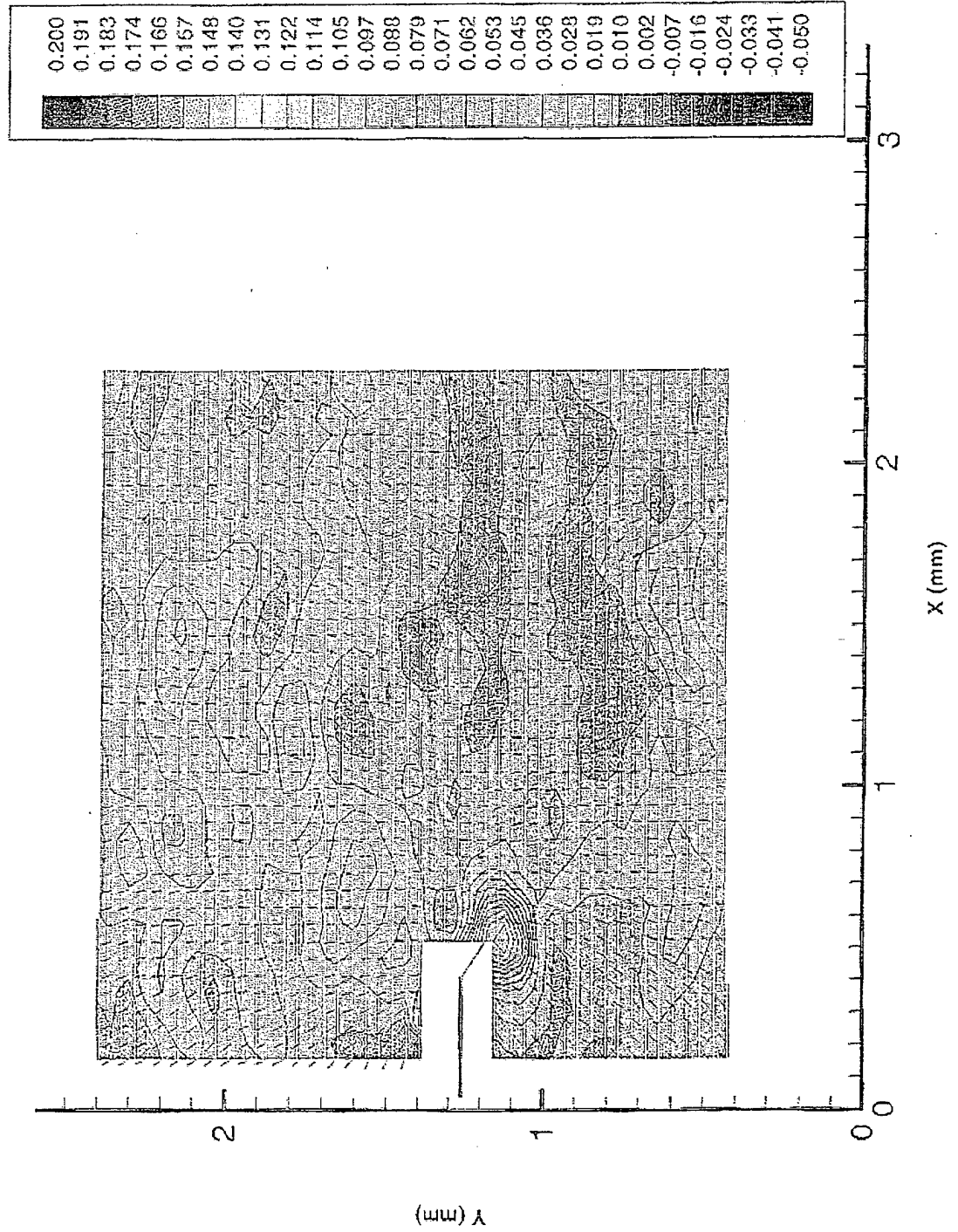
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Calibration





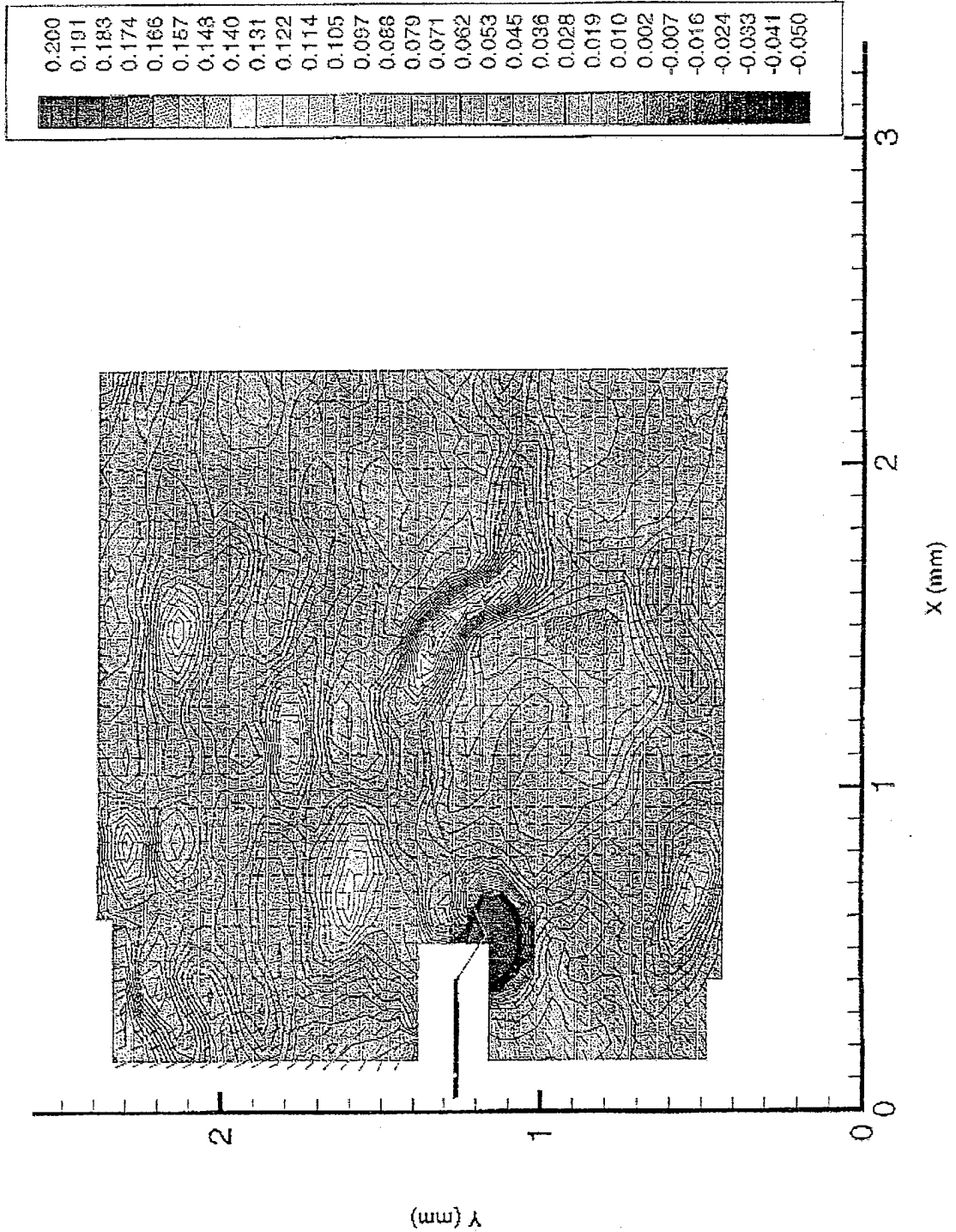
Maximum Principal Strain Distribution of 2.0% Far Field Strain During Loading





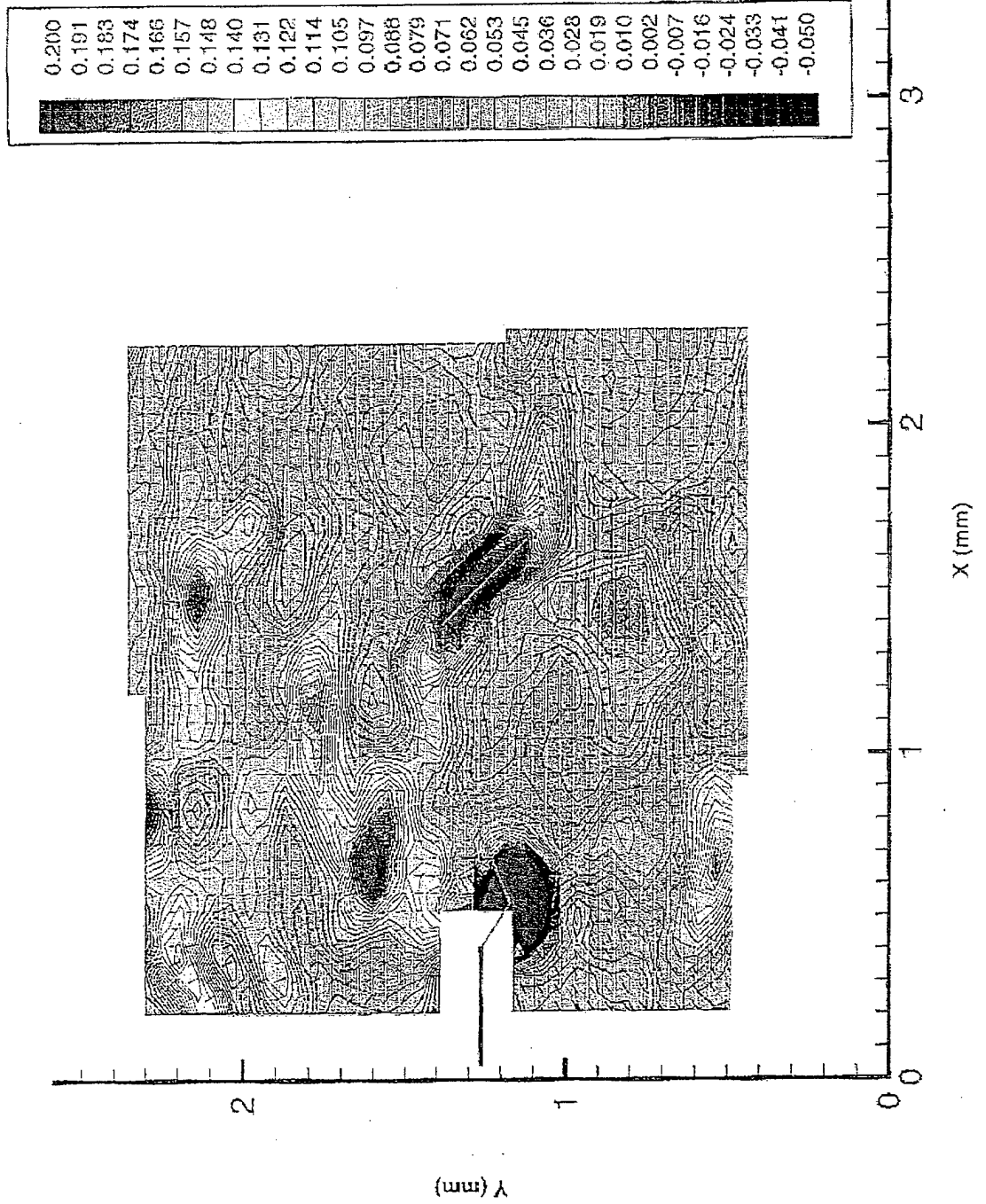
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Maximum Principal Strain Distribution of 6.0% Far Field Strain During Loading



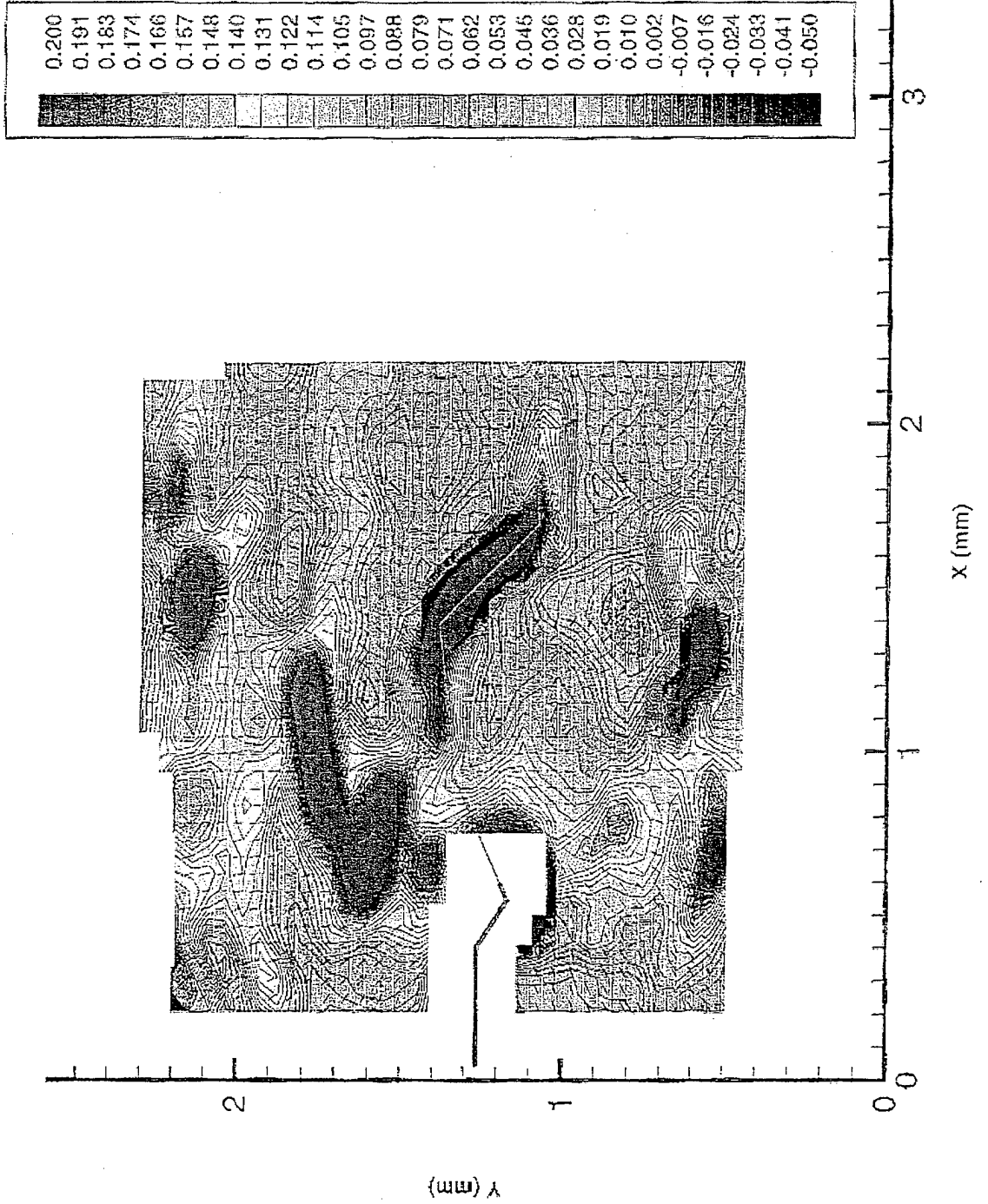


Maximum Principal Strain Distribution of 8.0% Far Field Strain During Loading





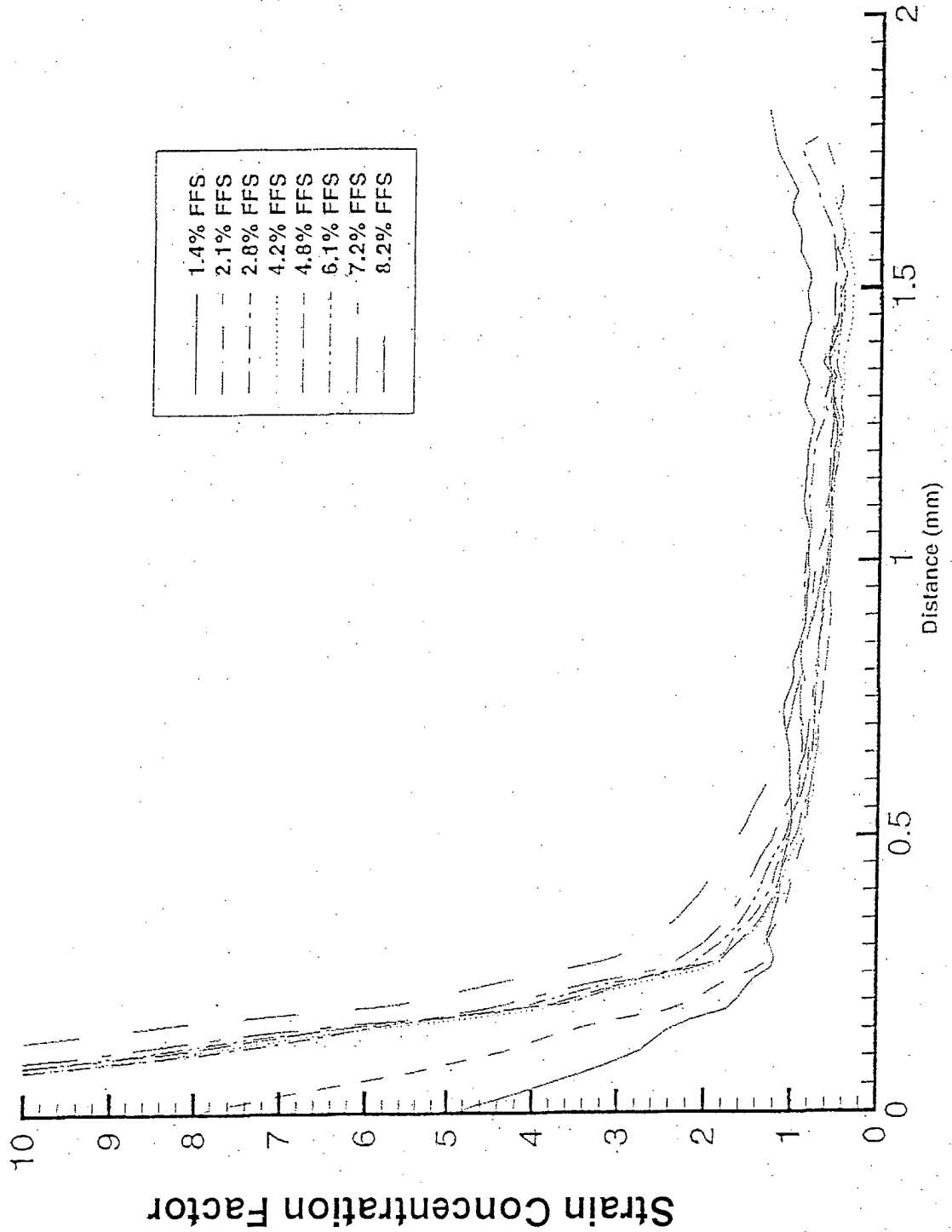
Maximum Principal Strain Distribution of 10.0% Far Field Strain During Loading





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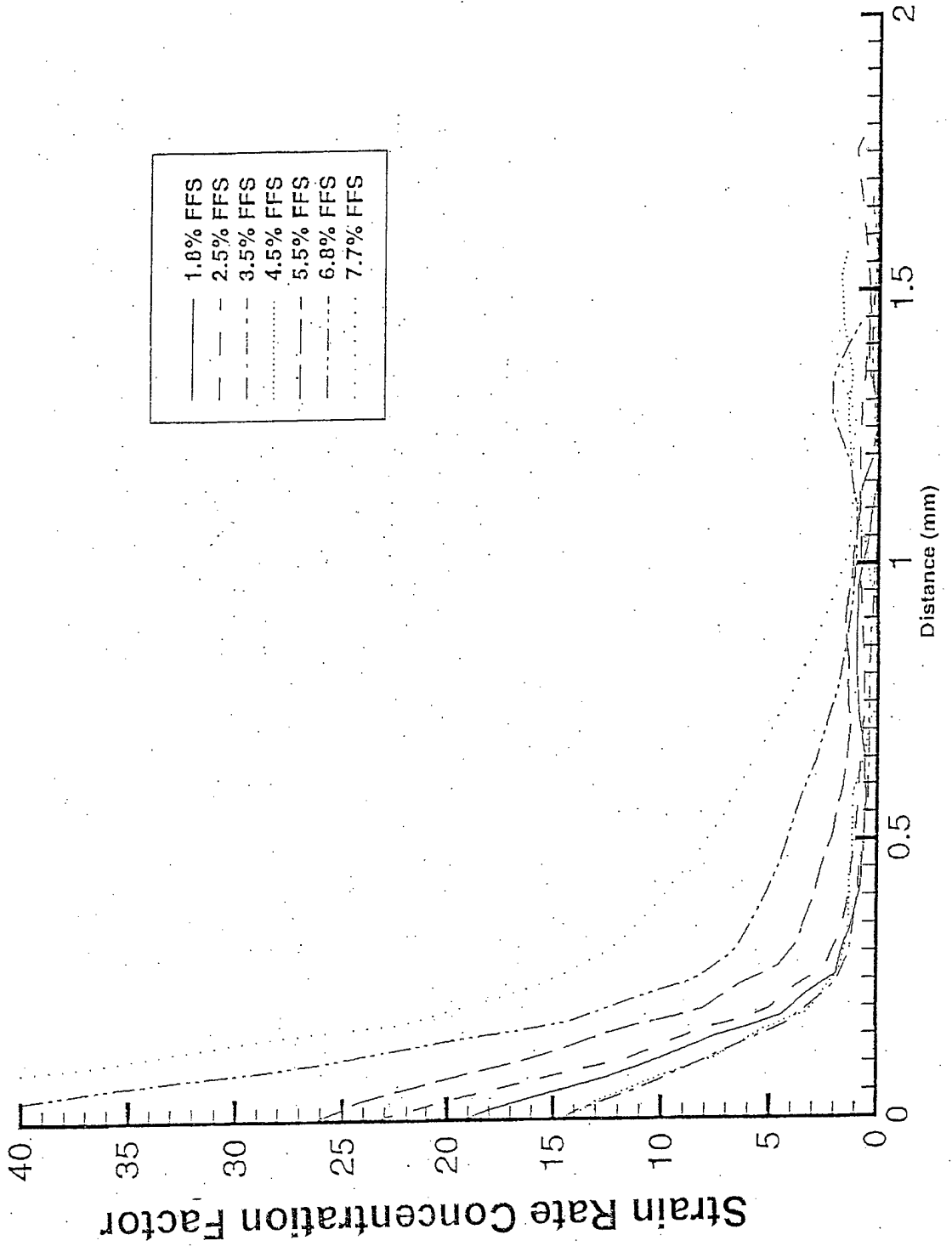
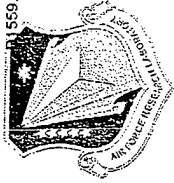
Strain Concentration Factors along the $y=0$ line for Far Field Strains from 1.4% to 8.2%





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Strain Rate Concentration Factors along the $y=0$ line for Far Field Strains from 1.8% to 7.7%





Conclusions



- ✚ The strain distributions near a filler particle depend on time and the magnitude of the applied stress.
- ✚ Both tensile and compressive strains exist in the material.
- ✚ The microstructure of the material has a significant effect on the strain fields near the crack tip.
- ✚ The crack growth mechanism consists of void generation and coalescence with the main crack tip.