

REPORT DOCUMENTATION PAGE

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8. PERFORMING ORGANIZATION REPORT

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Approved for public release; distribution unlimited.

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14. ABSTRACT

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(include area code)

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MEMORANDUM FOR PRS (In-House Publication)

FROM: PROI (STINFO)

22 May 2002

SUBJECT: Authorization for Release of Technical Information, Control Number: **AFRL-PR-ED-VG-2002-128**
C.T. Liu (PRSM), "Investigating the Effects of Specimen Thickness and Pressure on the Crack Growth Behavior of a Particulate Composite Material"

ASME Winter Meeting
(Blacksburg, VA, 24-28 June 2002) (Deadline = 19 June 2002)

(Statement A)

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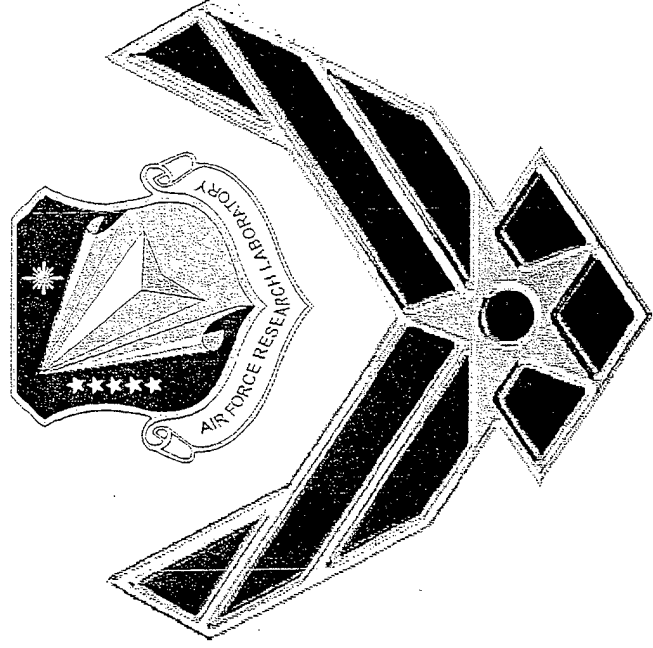
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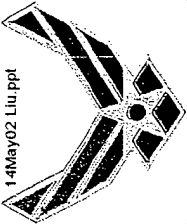
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PHILIP A. KESSEL Date
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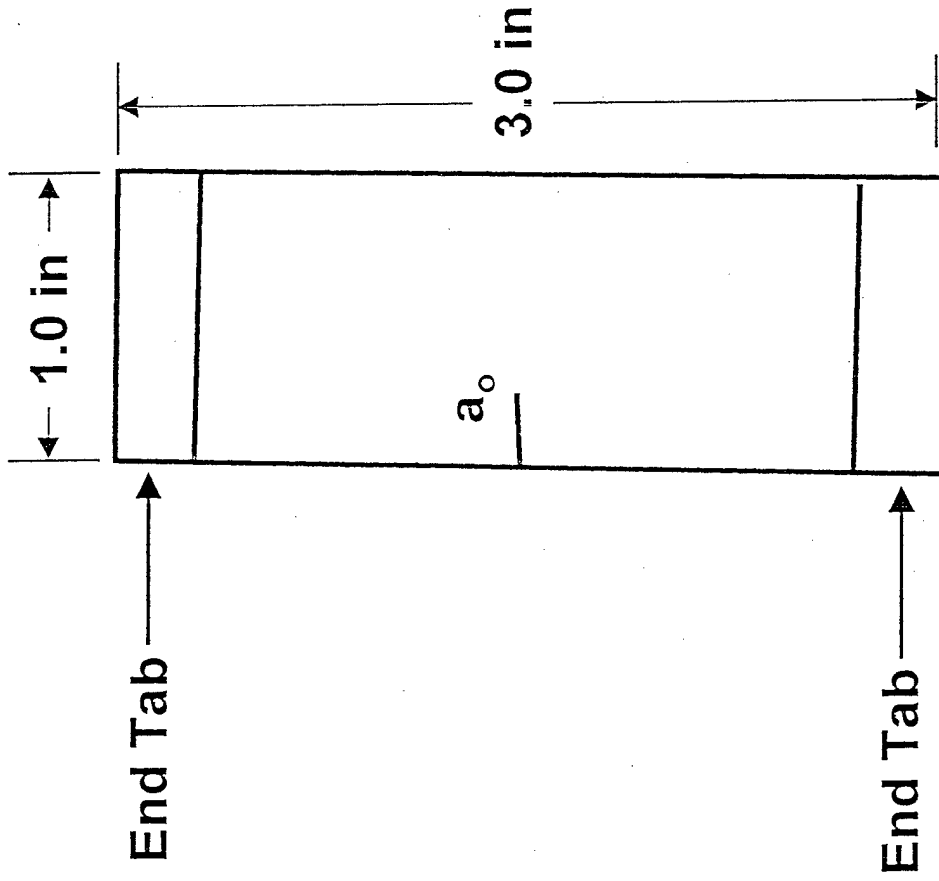
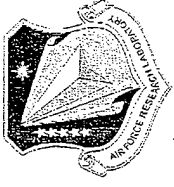
Investigating the Effects of Specimen Thickness and Pressure on the Crack Growth Behavior of a Particulate Composite Material

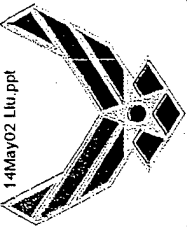


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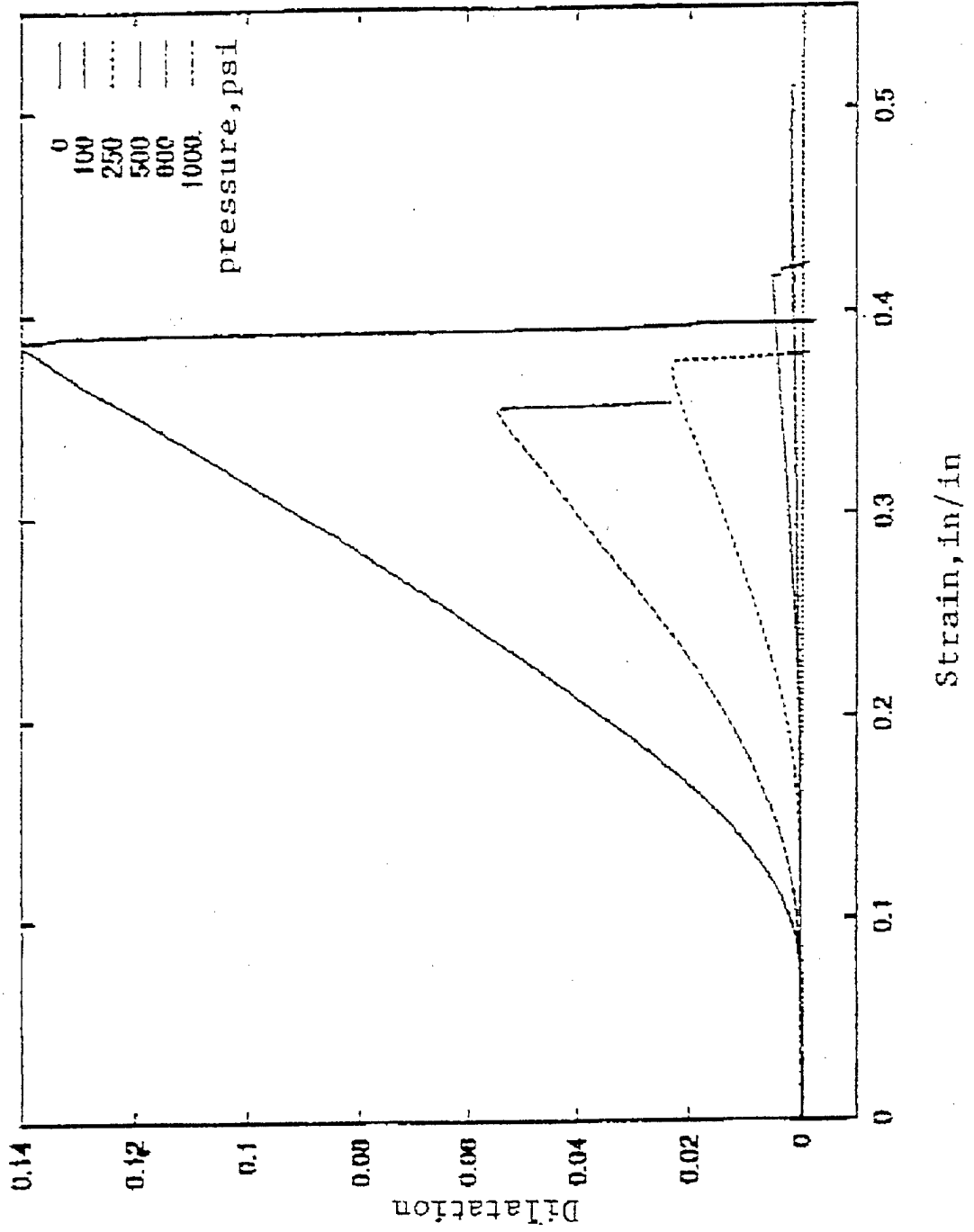


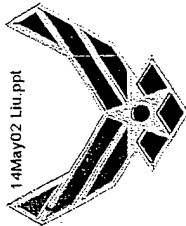
Specimen Geometry



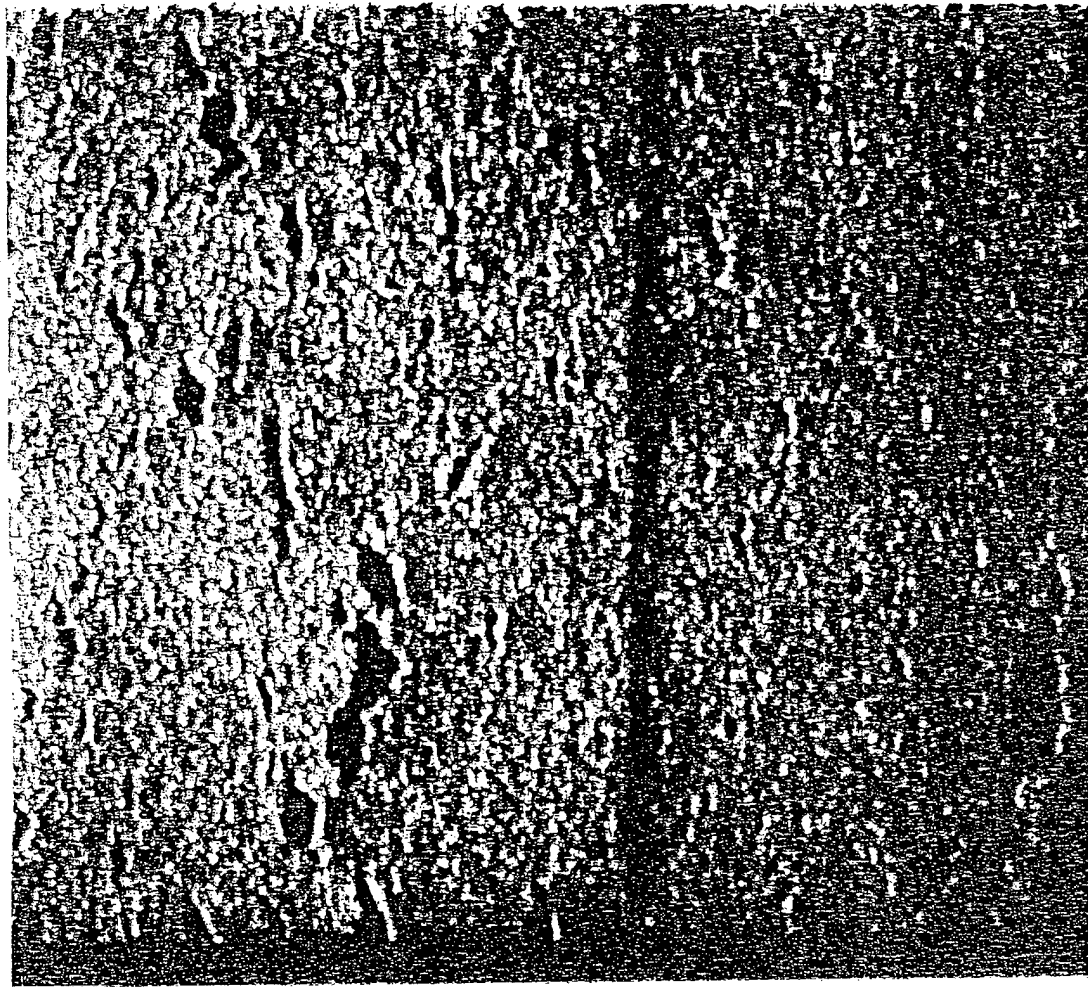


Volume Dilatation vs. Pressure

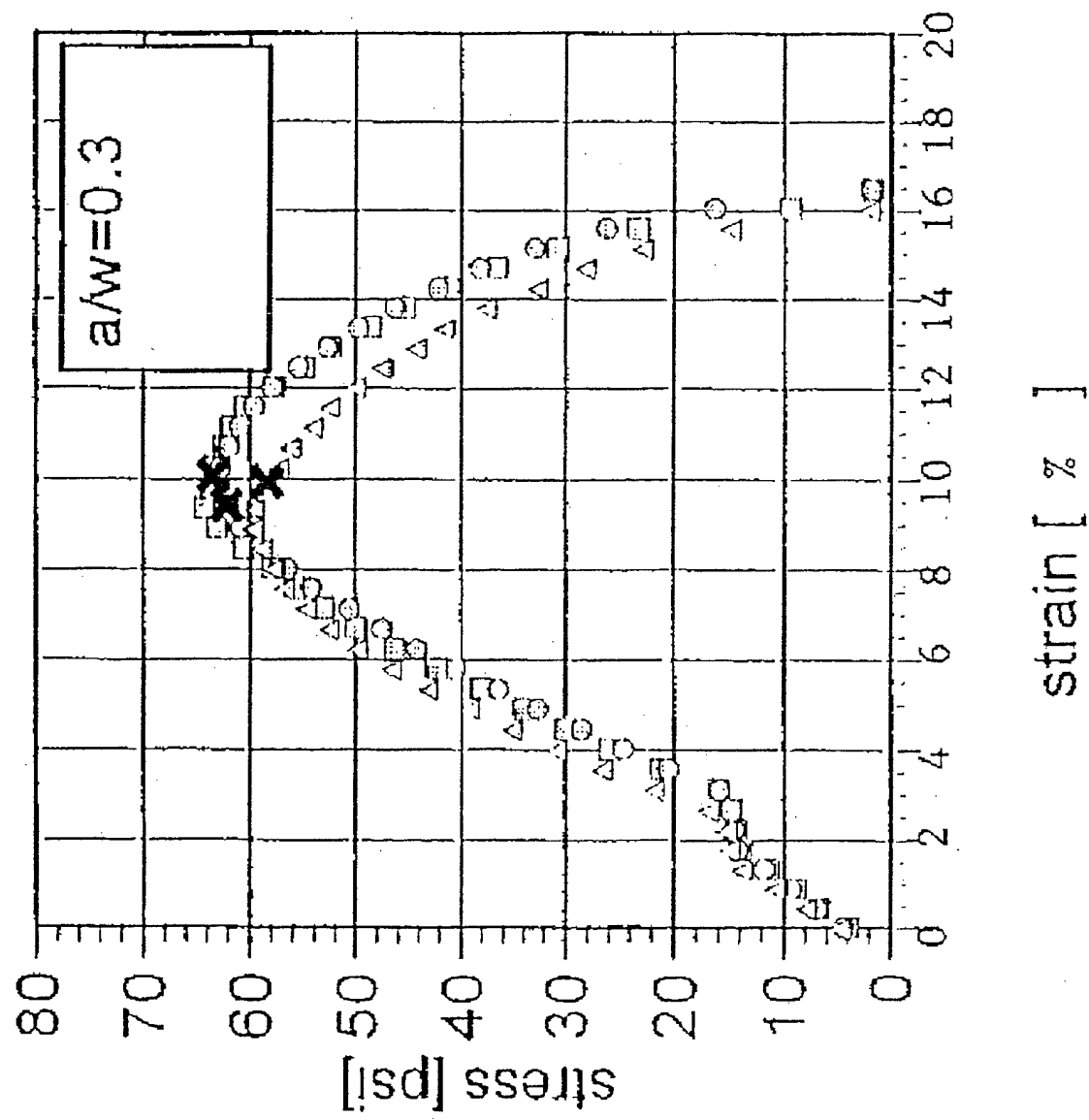


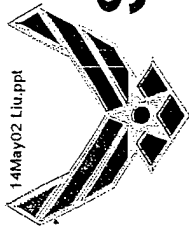


Microcracks in the Specimen under Pressure



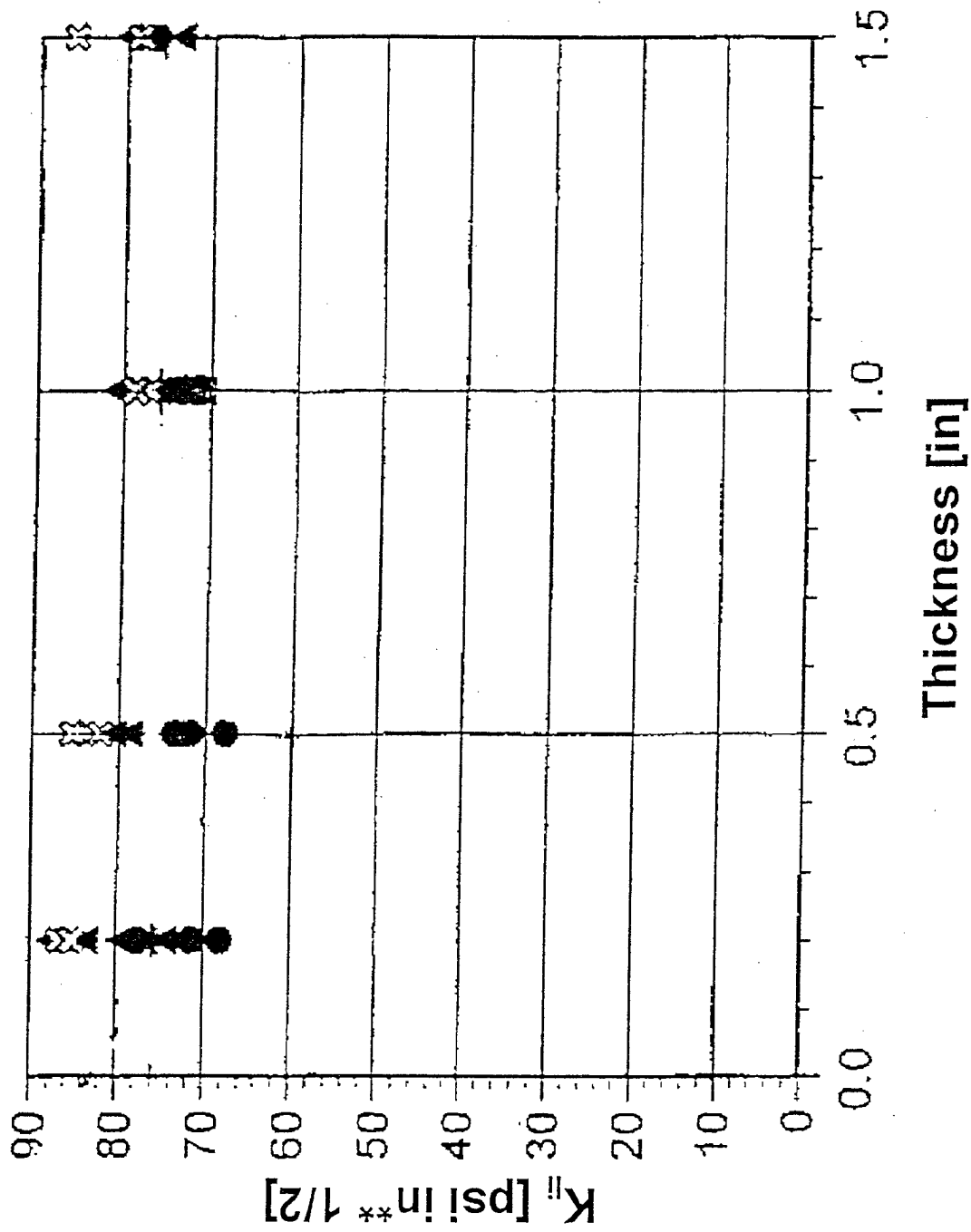
Stress-Strain Curves under Ambient Pressure

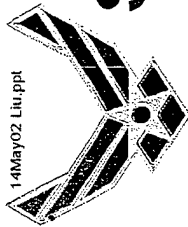




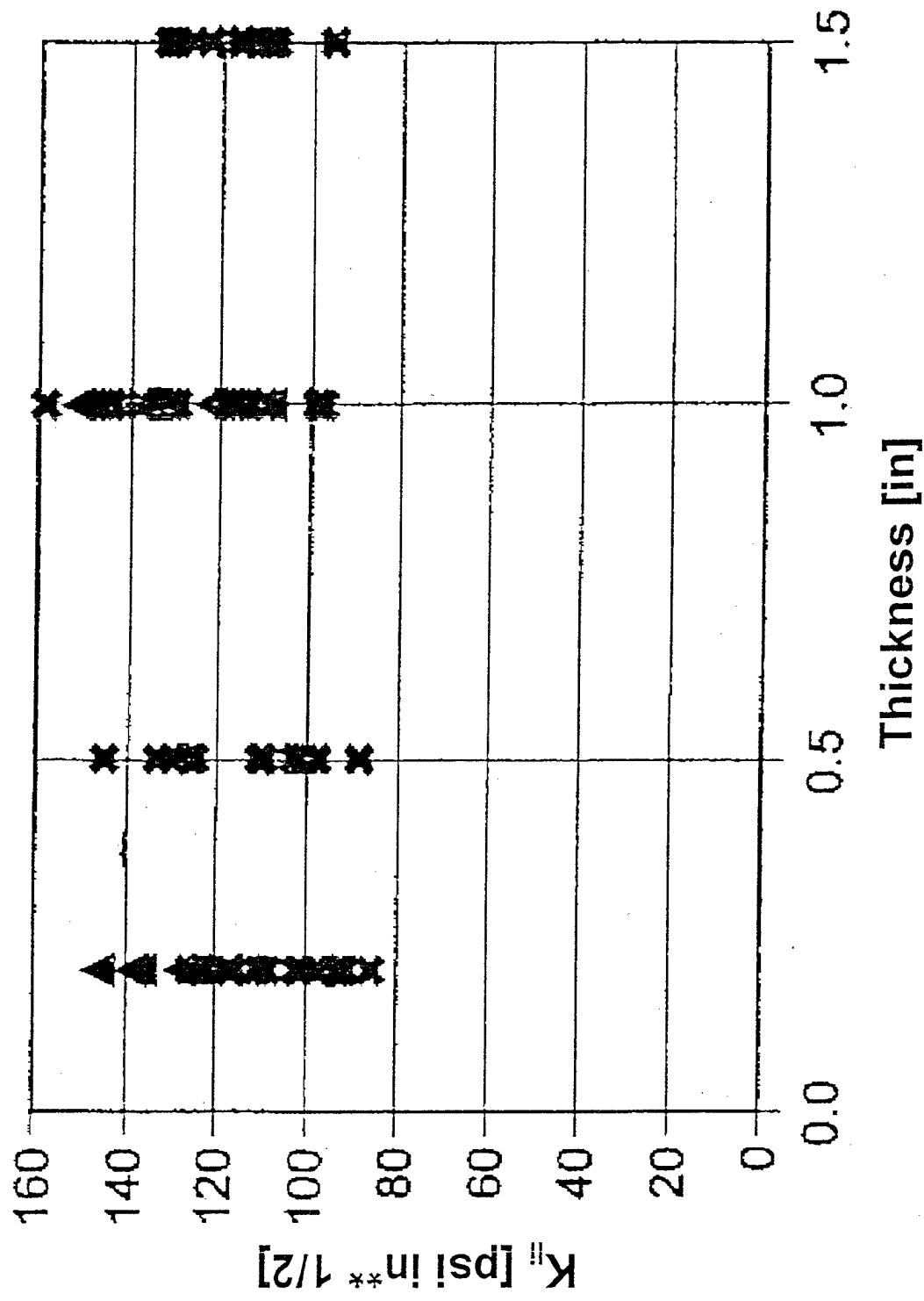
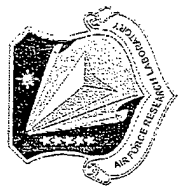
14May02 Liu.ppt

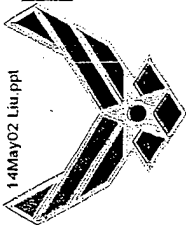
Mode I Stress Intensity Factor vs. Specimen Thickness. (Ambient Pressure)



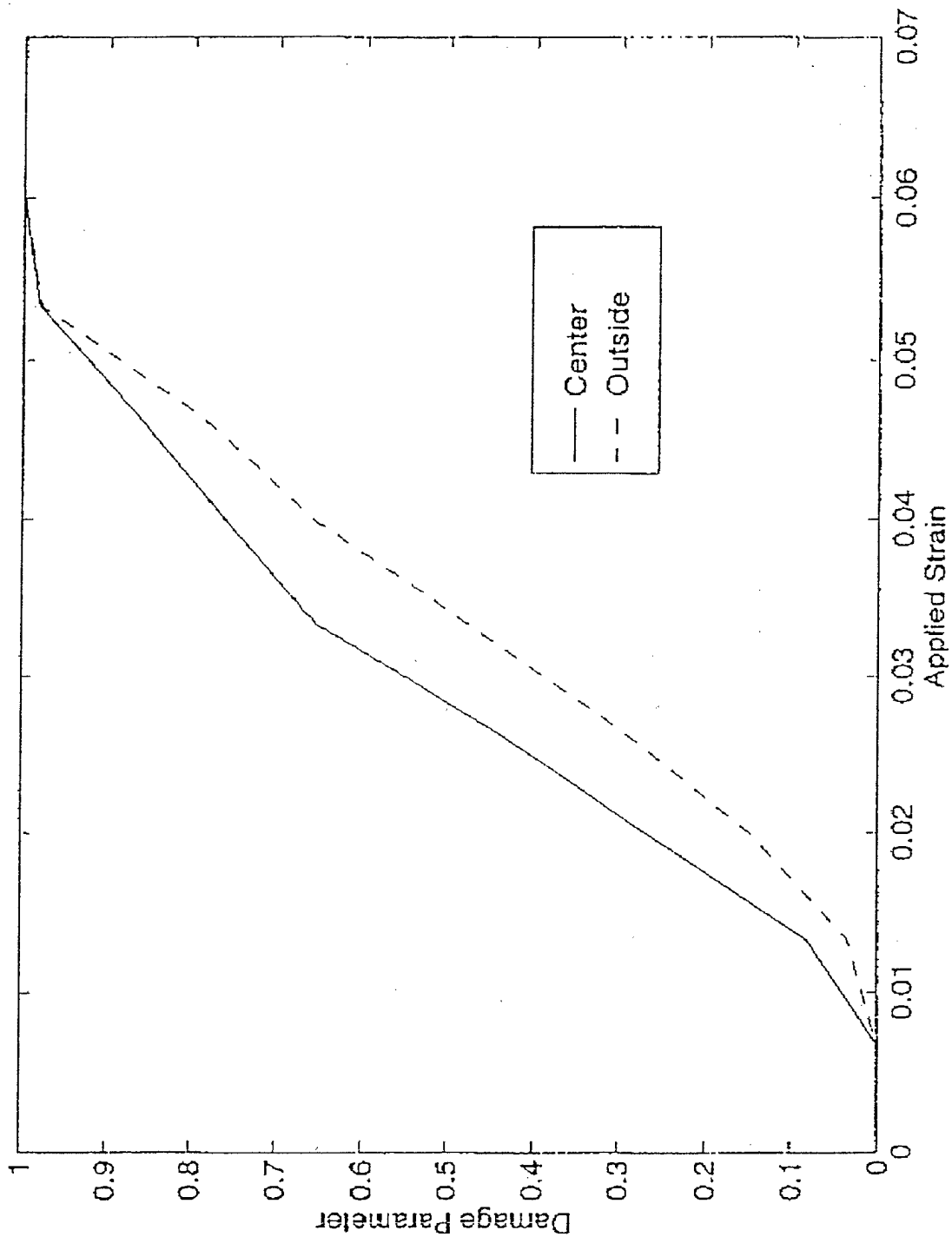
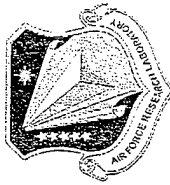


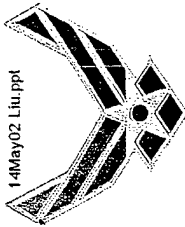
Mode I Stress Intensity Factor vs. Specimen Thickness. (1000 psi Pressure)



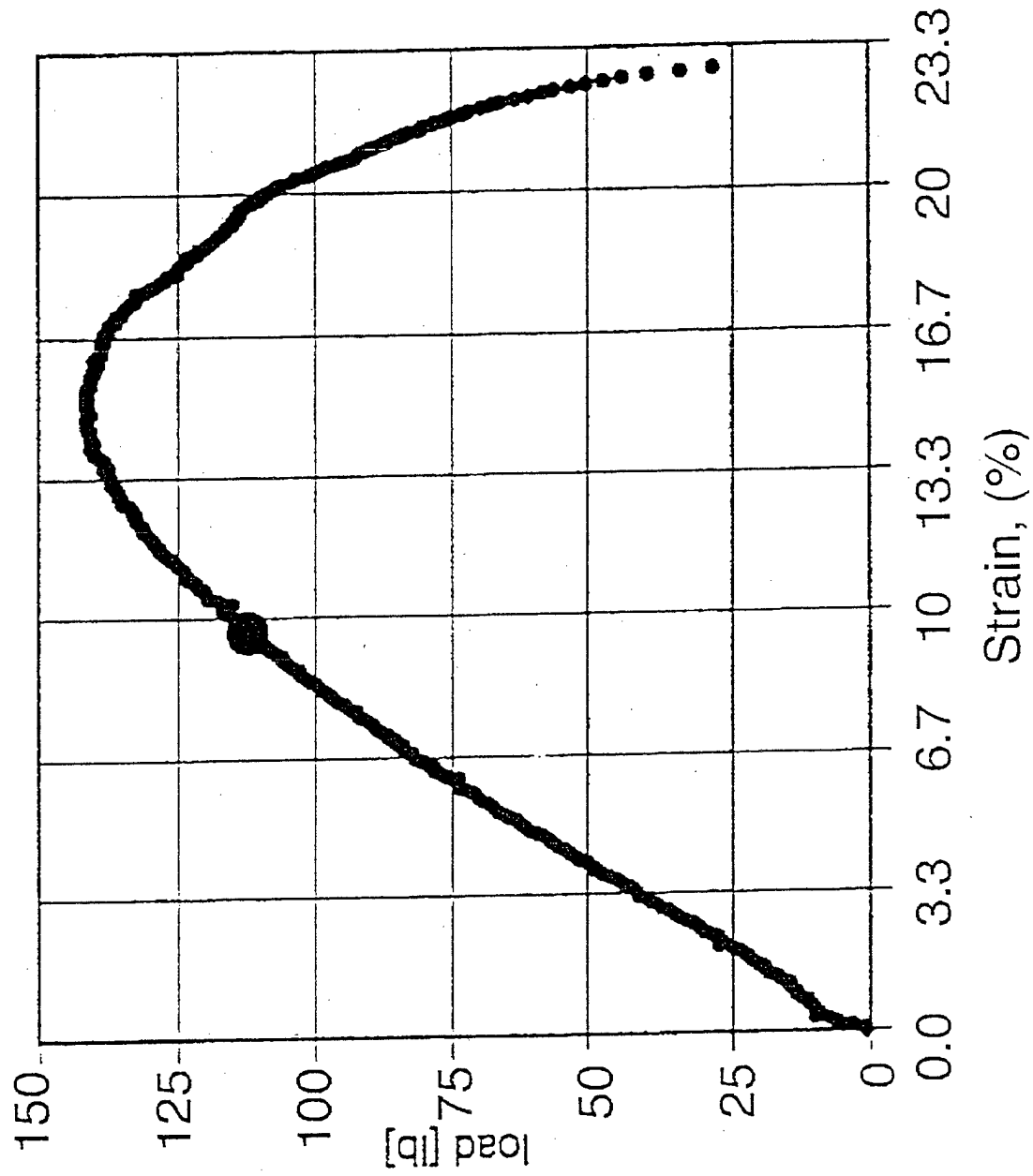


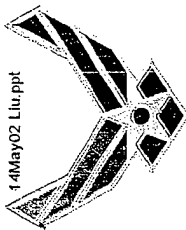
Damage Distribution near the Center and the Surface of the Specimen





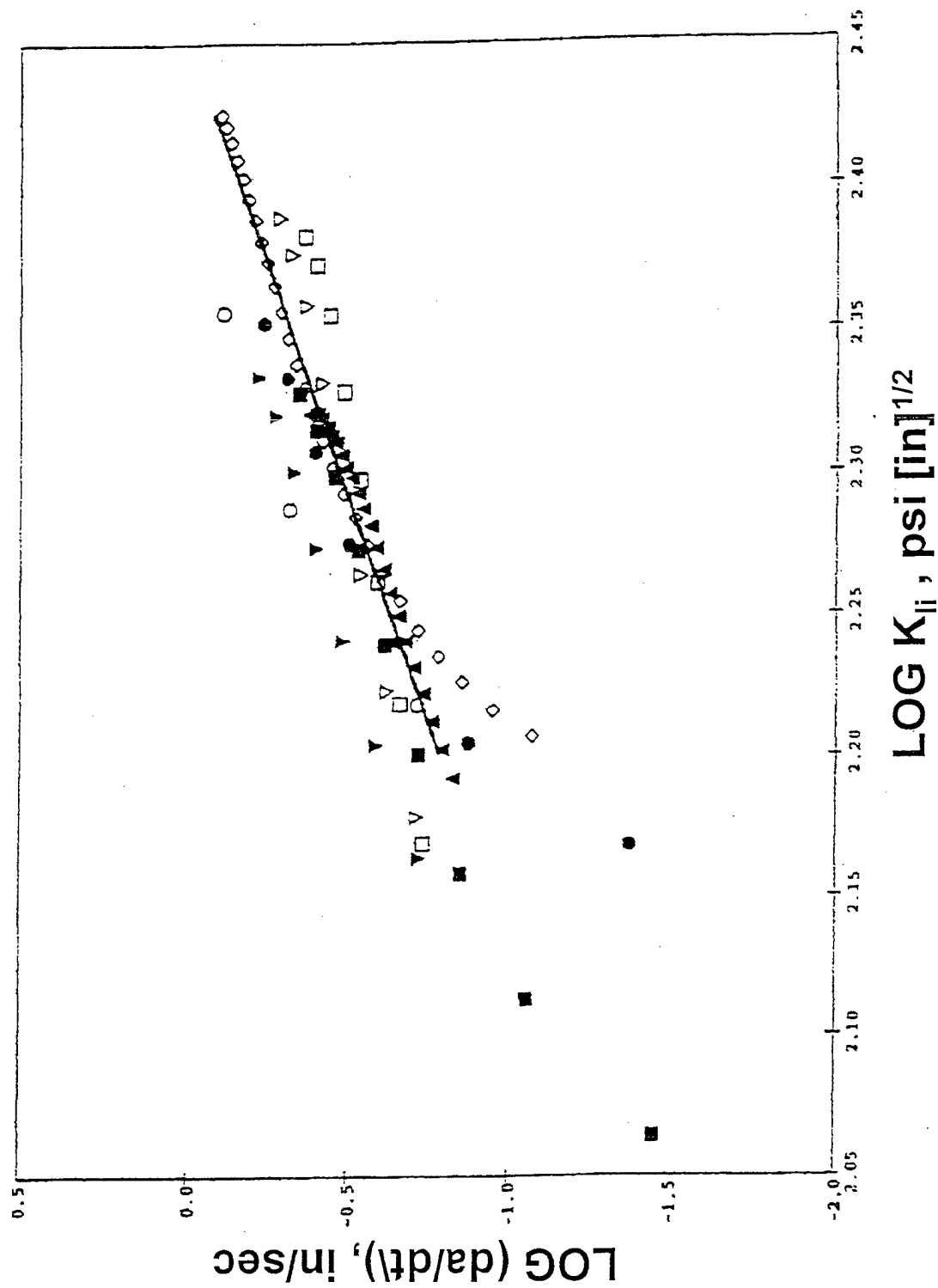
Stress-Strain Curve under 1000 psi Pressure

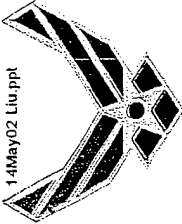




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Crack Growth Rate vs. Mode I Stress Intensity Factor

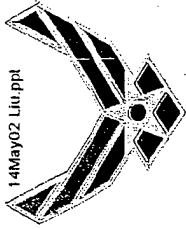




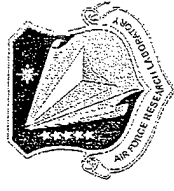
Conclusions



1. The critical Mode I stress intensity factor, K_{II} , for the onset of crack growth is insensitive to the specimen's thickness.
2. Plane strain fracture toughness does not exist for this material.
3. Brittle fracture occurs under ambient pressure, whereas a considerable amount of stable crack growth occurs under 1000 psi confined pressure.
4. A power law relationship exists between the crack growth rate and the Mode I stress intensity factor.



Objectives



- Investigate the Effects of Specimen Thickness and Confined Pressure on the Crack Growth Behavior of a Particulate Composite.
- Specimen Thickness (in.): 0.2, 0.5, 1.0, 1.5.
- Confined Pressure (psi): Ambient, 1000.