

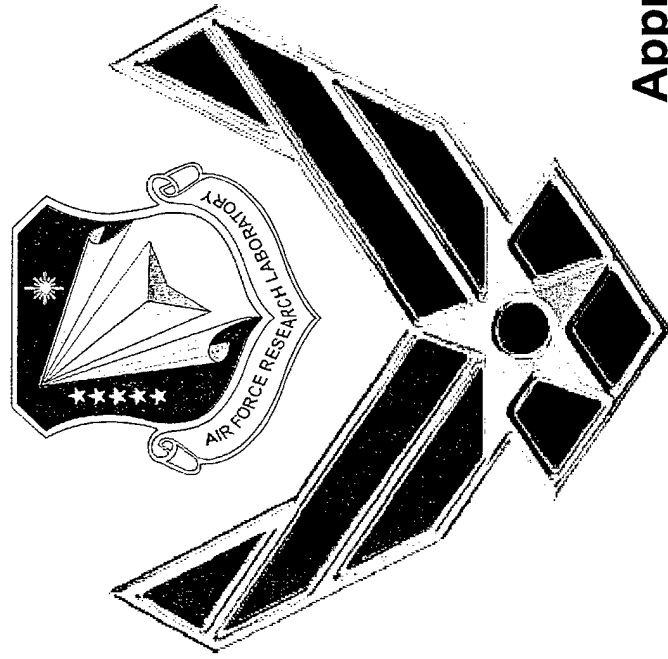
# REPORT DOCUMENTATION PAGE

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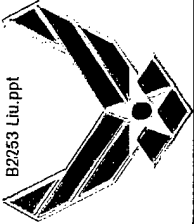
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# Investigating the Strain Rate Effects on Cumulative Damage in a Highly Filled Polymeric Material



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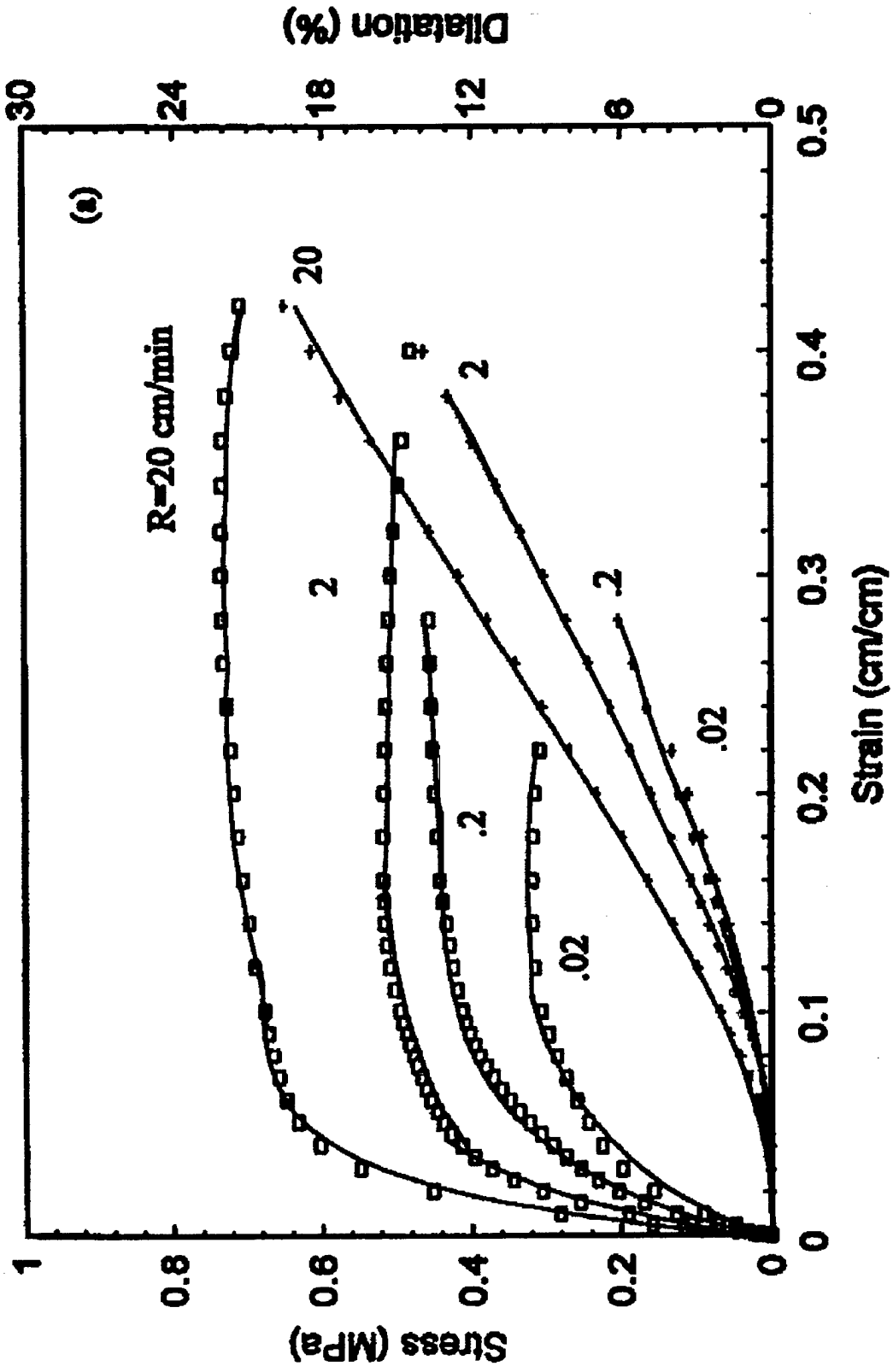
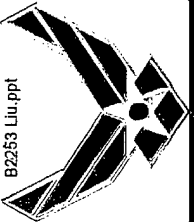
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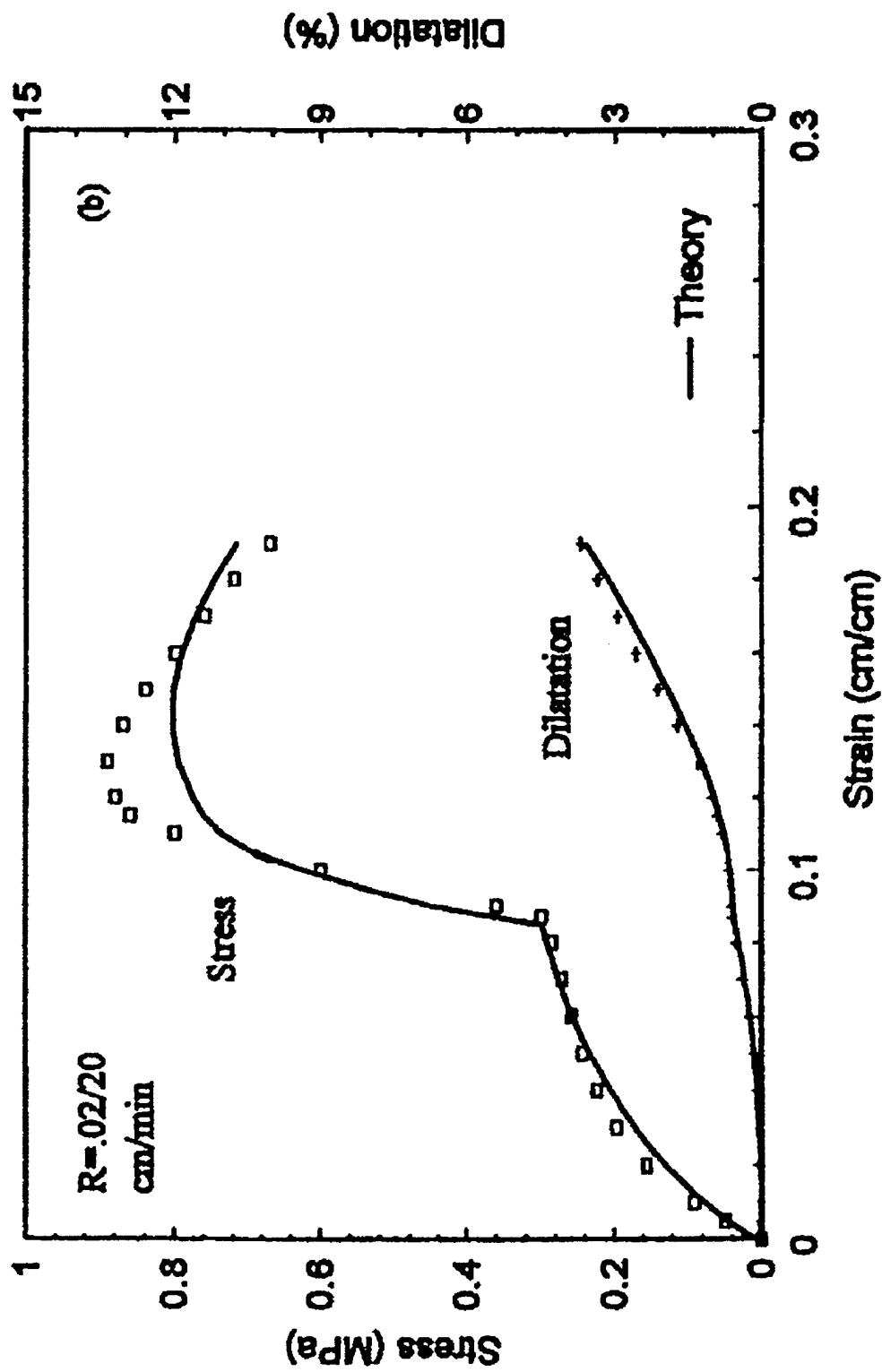
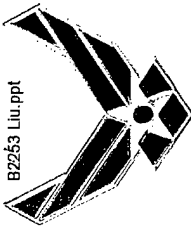


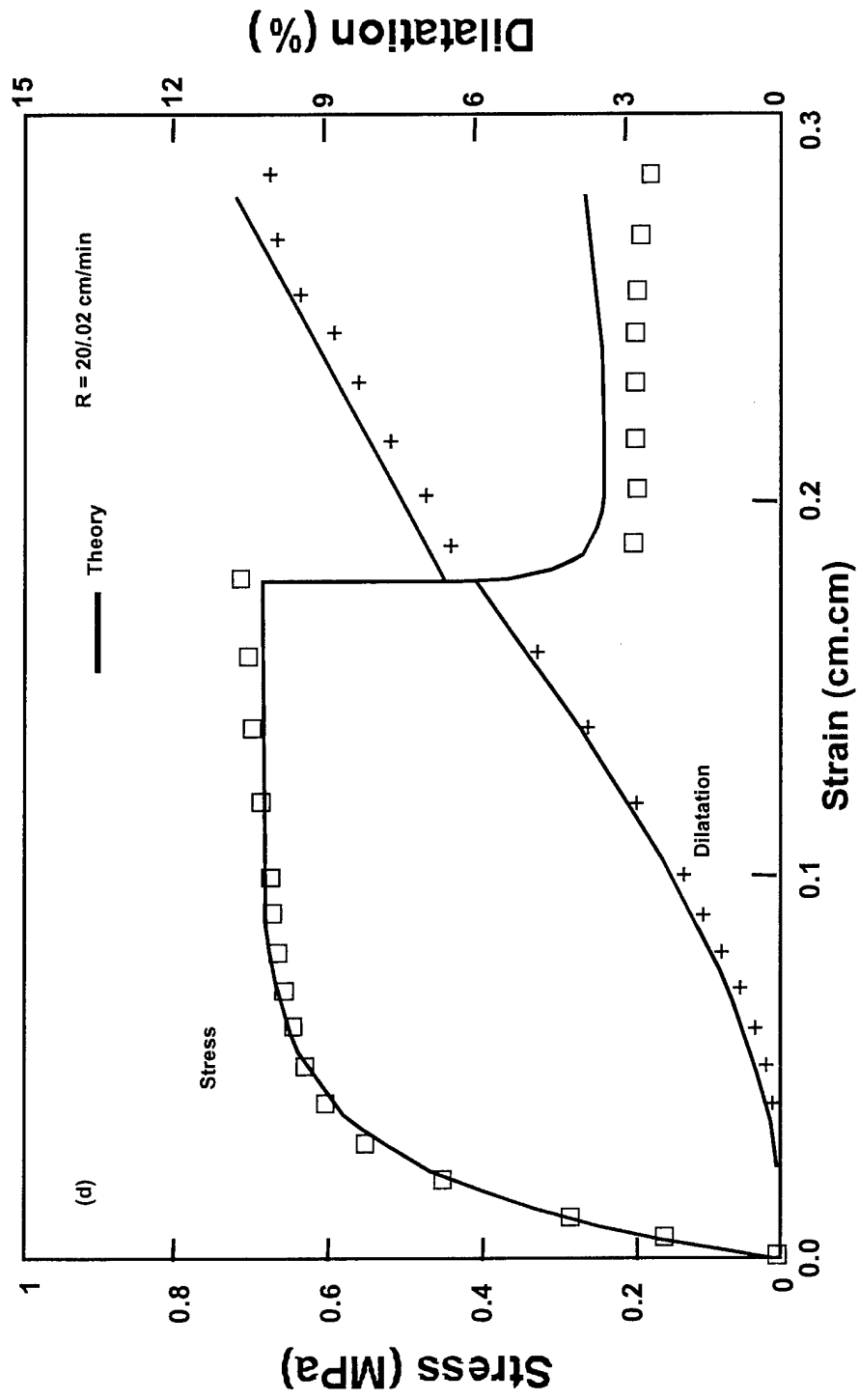
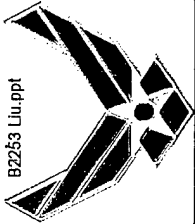
# Objective:

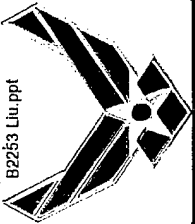


- Investigate Cumulative Damage in a Highly Filled Polymeric Material under Constant and Dual-Displacement Rate Loading Conditions.
  - Constant Displacement Rates: 0.02, 0.2, 2, 20 cm/min
  - Dual-Displacement Rate:
    - 0.02 cm/min – 20 cm/min
    - 0.2 cm/min – 20 cm/min
    - 20 cm/min – 0.02 cm/min







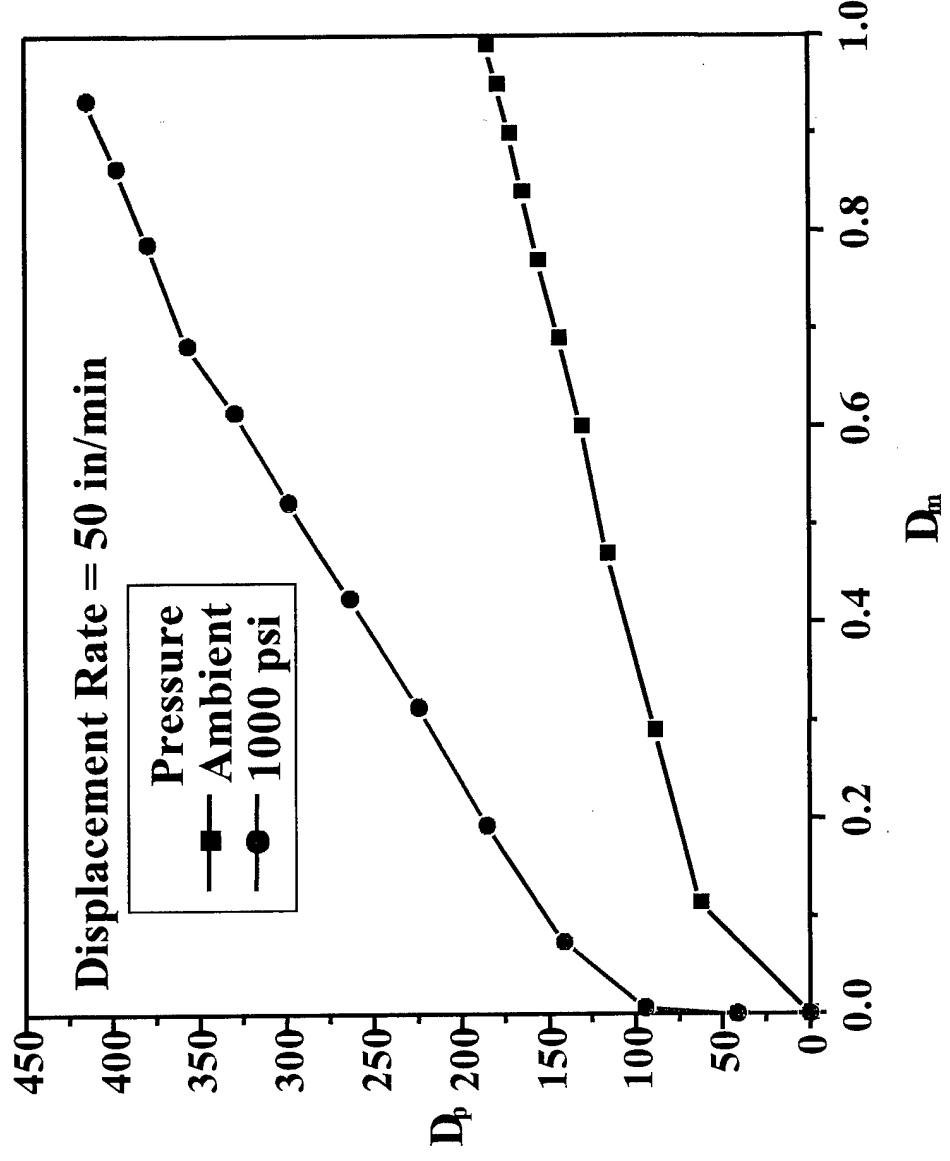


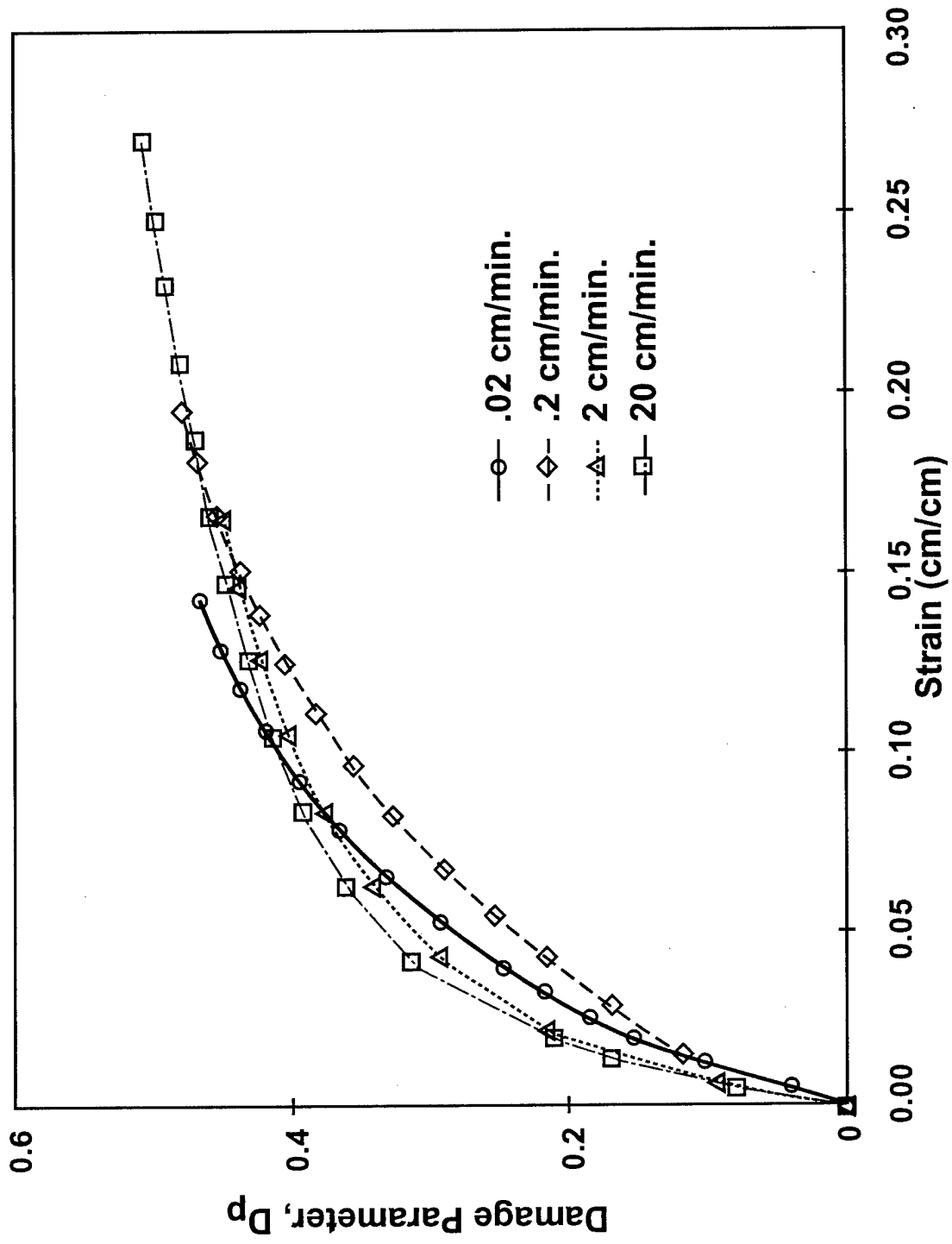
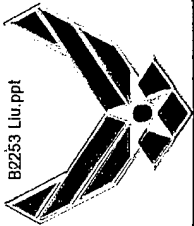
Phenomenological Damage Parameter  $D_p$ :  $D(t) = \left[ \int_0^t \sigma^\beta dt \right]^{1/\beta}$

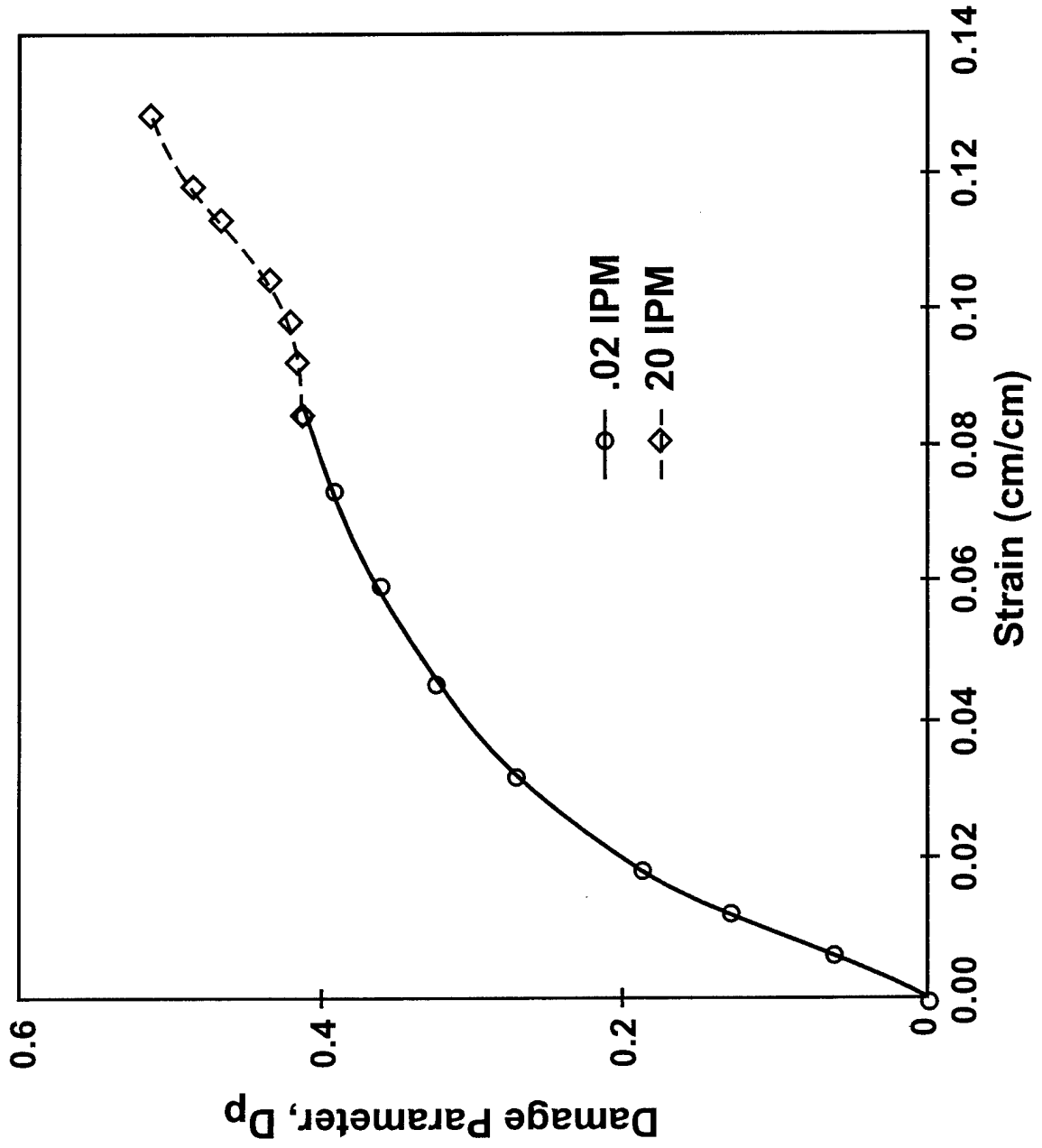
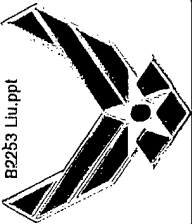
Micromechanics Damage Parameter  $D_m$

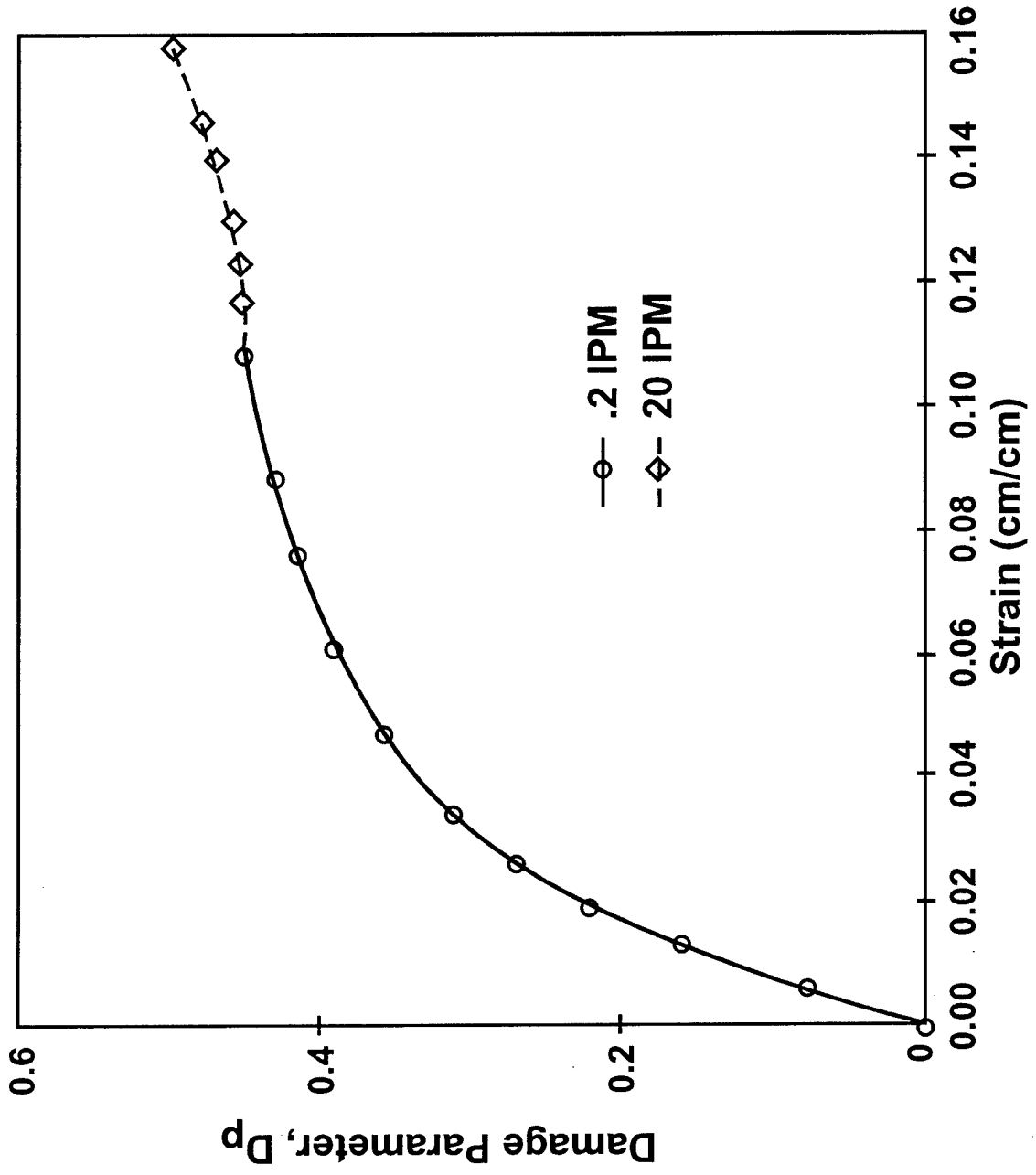
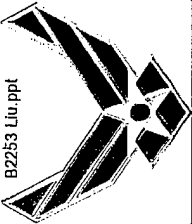
Damage Potential Function:  $F = f(\epsilon_{ij}) - K$

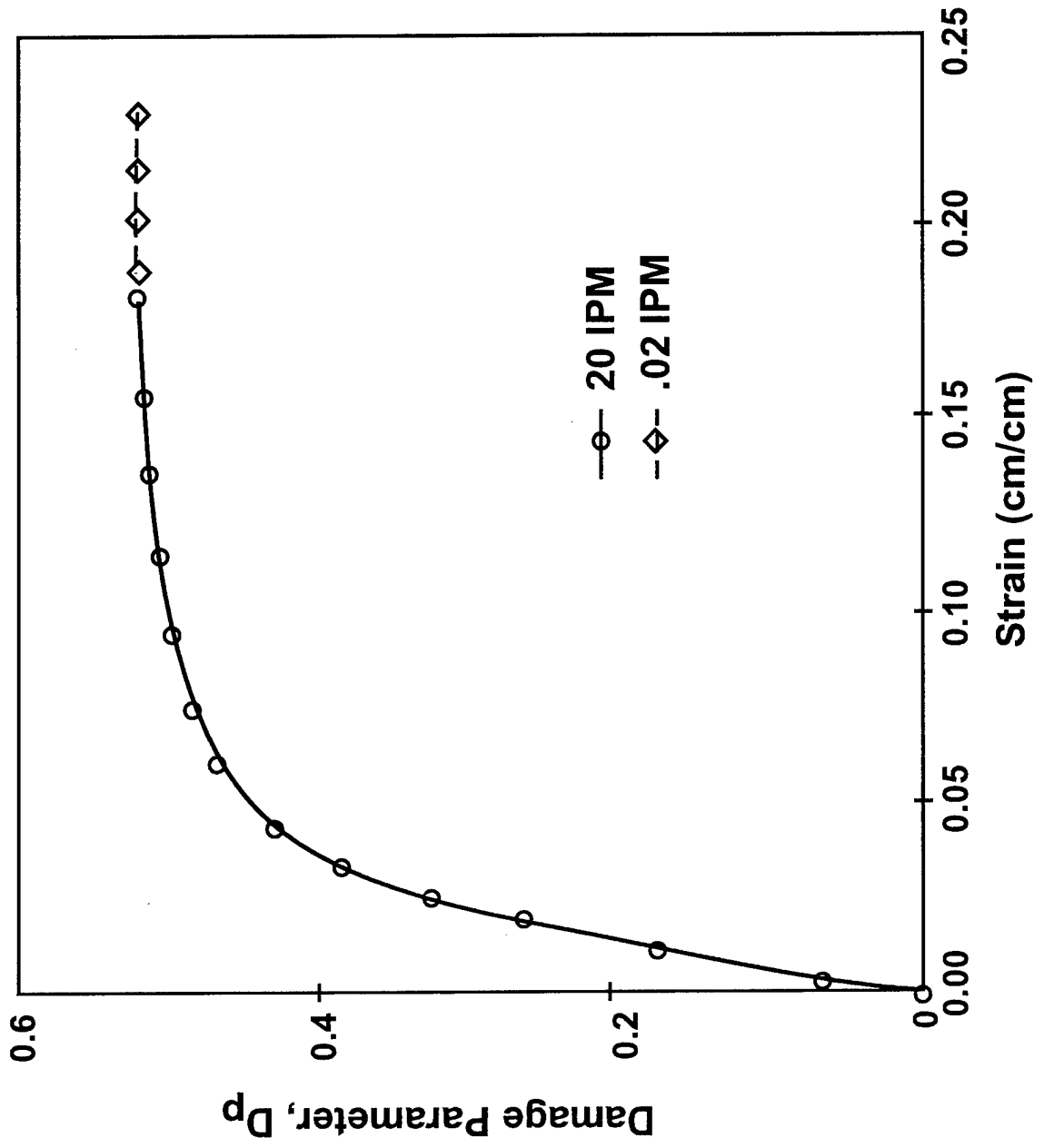
Damage Evolution Law:  $dD_m/dt = [dK/dt] g(\epsilon)$

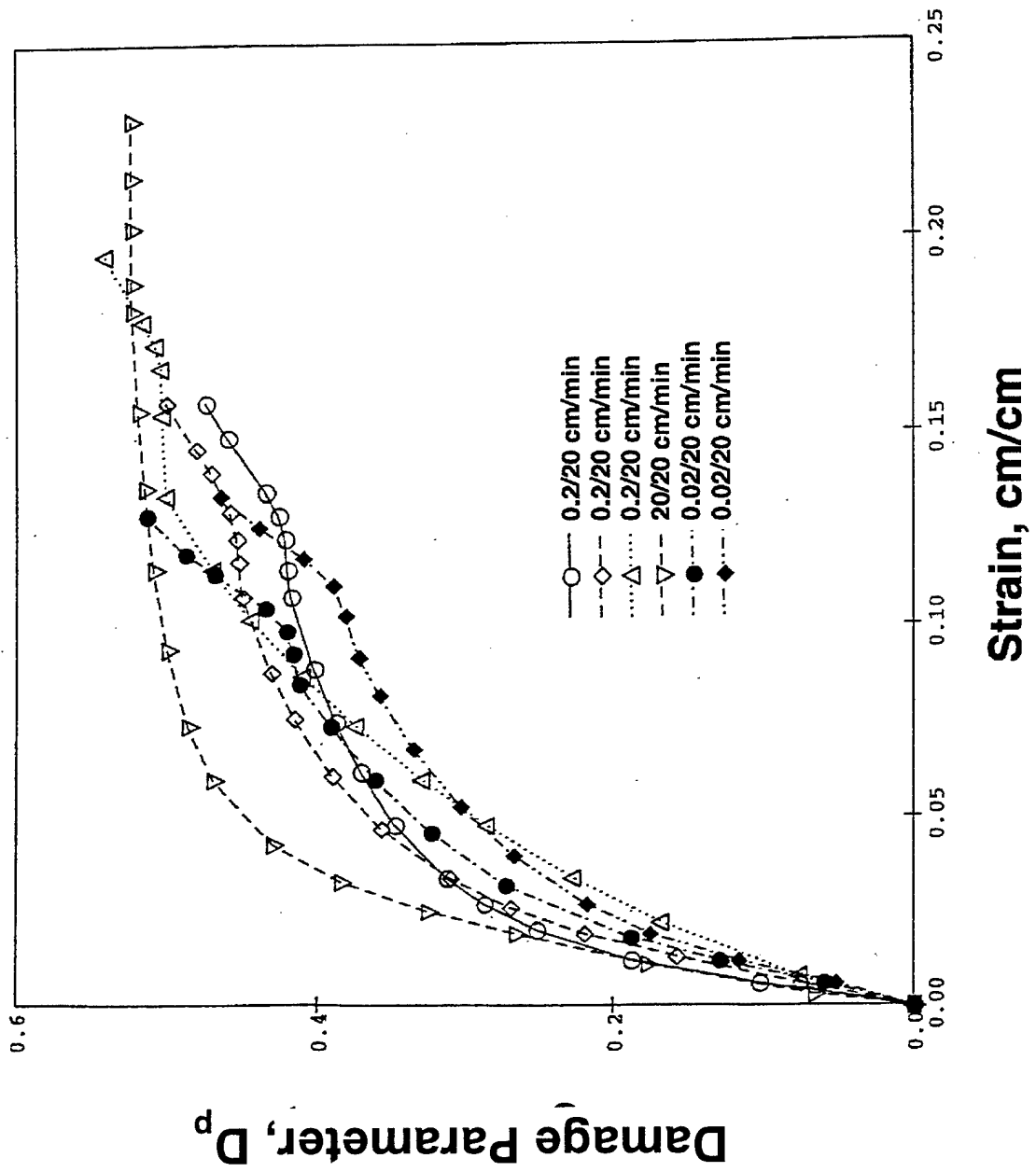


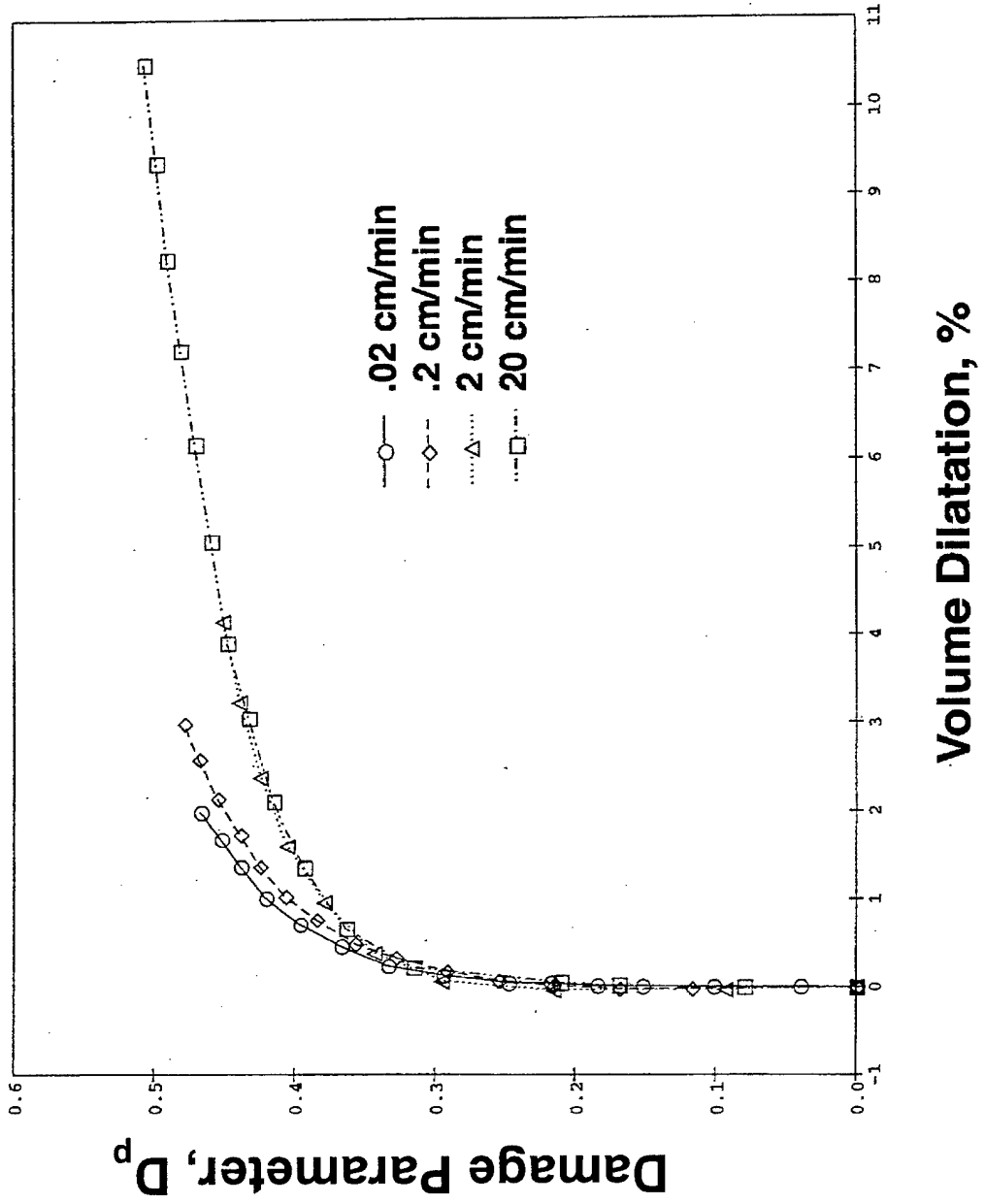
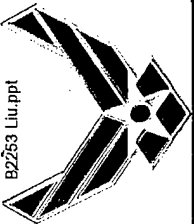


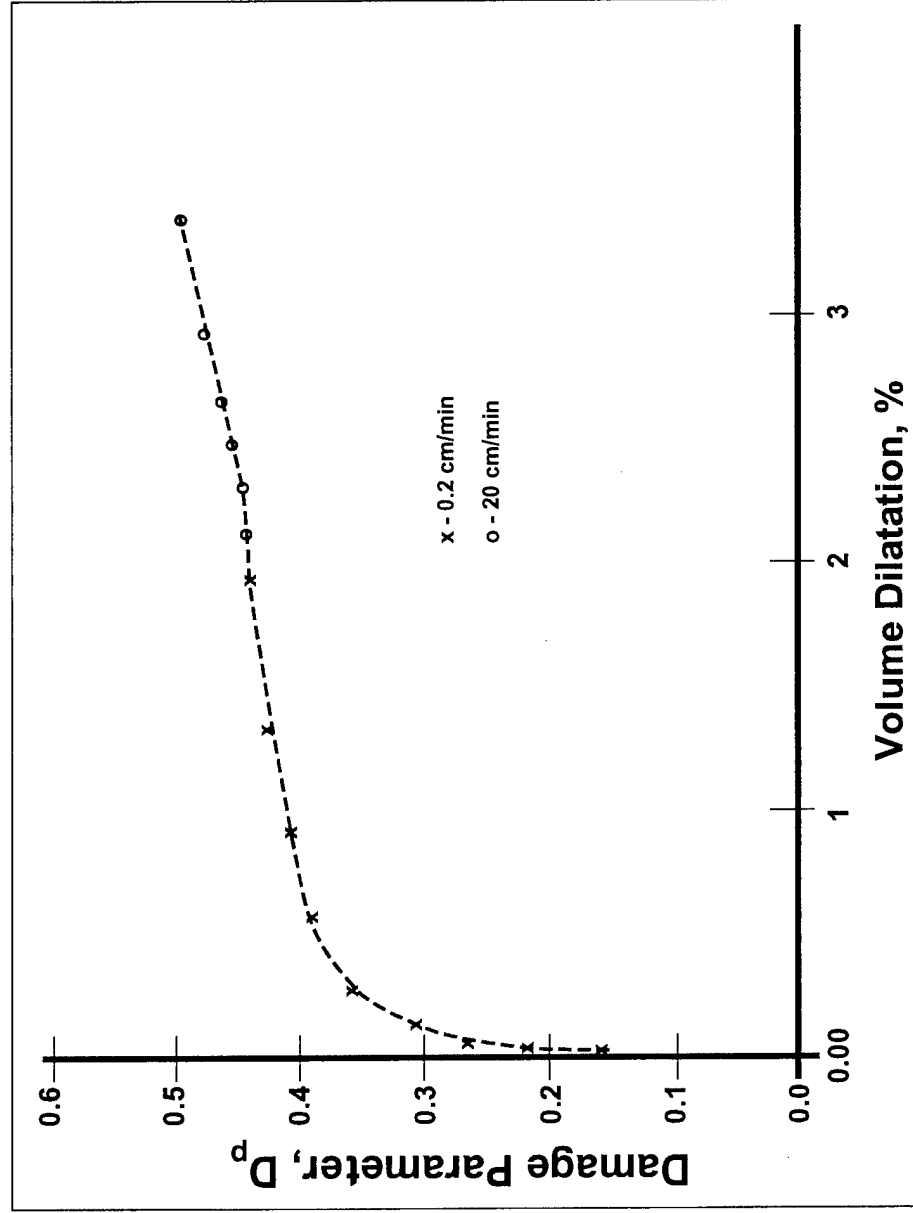














## Conclusions:



- **For a given time, displacement rate has a significant effect on the damage intensity.**
- **The critical damage intensity is insensitive to the displacement rate and loading history.**
- **A good correlation exists between damage intensity and volume dilatation.**
- **The phenomenological damage parameter correlates well with the micromechanics damage parameter**