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PUFF74/PC

A Material Response Computer Code for PC Computer

The **PUFF74/PC** code is a computer code, which calculates stress wave formation and propagation by numerical integration of the conservation equations in a one-dimensional Lagrangian coordinate system. The code has been under development since 1961 and has evolved from a simple hydrodynamics code to a flexible material response code, which includes the effects of material strength, porosity, and fracture for both homogeneous and composite materials.

The code at present version (Version 4.0) is capable of handling the following physical models:

1. A framework for calculating the material response in composite materials,
2. A pressure-volume-energy equation of state model for homogeneous materials or constituents of a composite material,
3. A pore-compaction model for porous homogeneous materials or constituents of a composite materials,
4. A one-dimensional viscoplastic model for geometric dispersion effects in composite materials.

The latest model development for the **PUFF74/PC** code has been accomplished under the CADRE Program. As part of this program studies have been made to determine the dynamic material properties, which govern the response of composite materials to rapid energy deposition.

To facilitate the input procedures for radiation deposition calculations, an automatic initial zoning model was added to the PUFF 66 code in extensive use of the code. Reference 3 presents the description of the automatic zoning model.1969 by Cooper. The guidelines used to develop this model evolved through

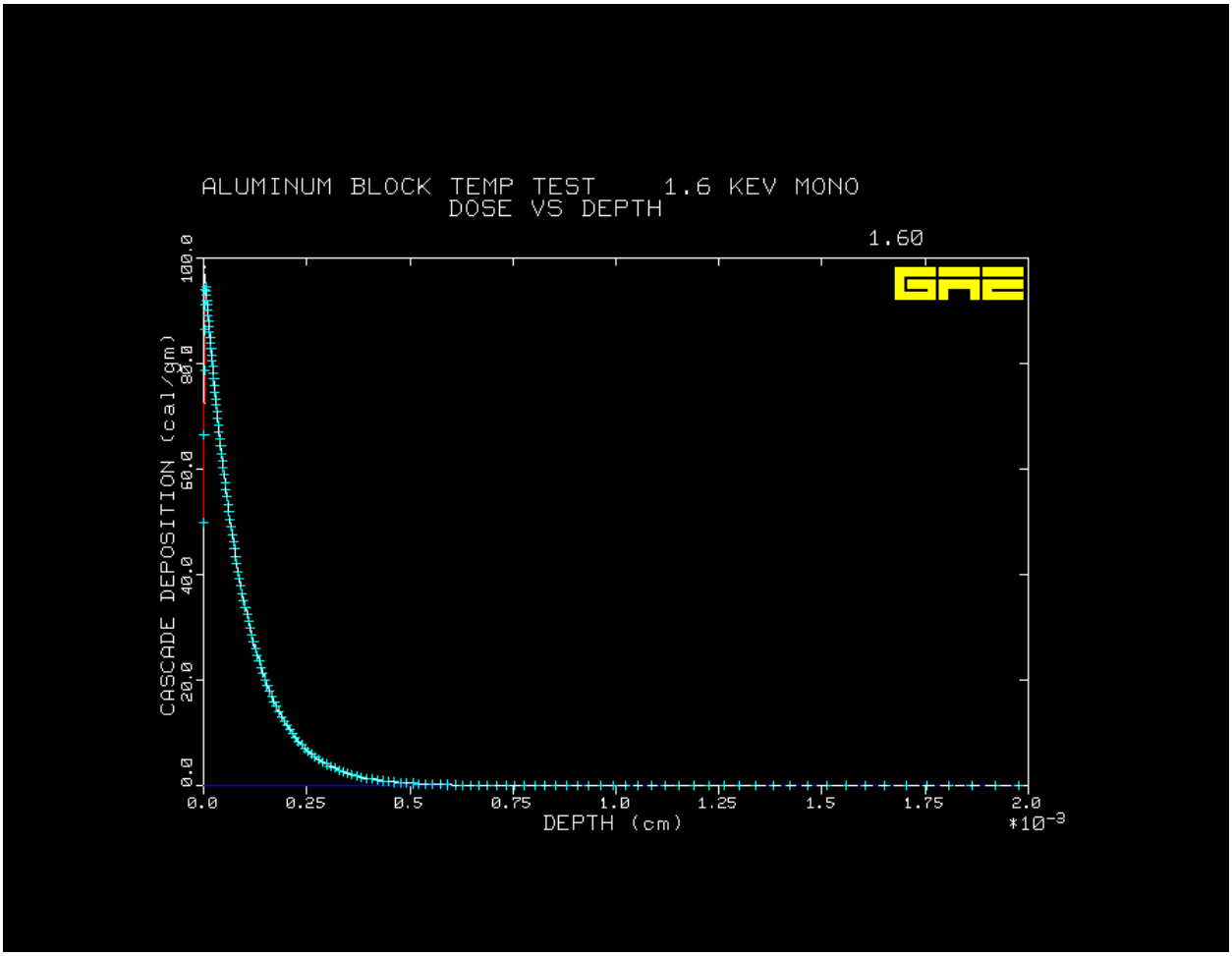
The next addition to the PUFF code was the framework for introducing a free surface into the sample mesh a t a location where material fracture is detected. The logic for introducing free surfaces, calculating the response of free surfaces as a function of time and recombining fractured segments was developed. model in the original coding. Since the coding was written in a modular form, more sophisticated fracture models could be substituted with a minimum of effort.

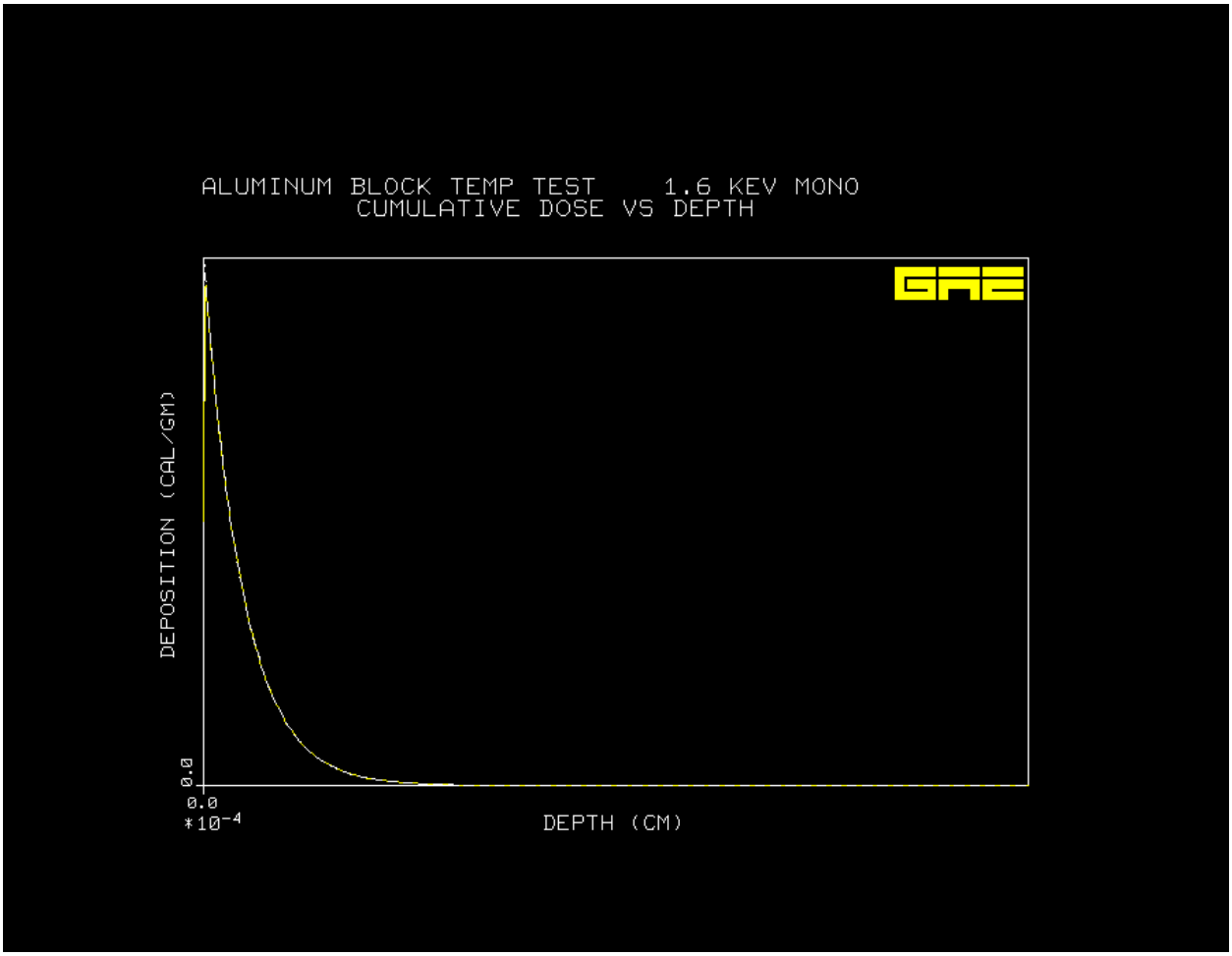
As model development and calculations of experimental tests continued, a graphics package was added to the PUFF code to allow the user to produce on-1ine plots and externally-produced plots and data storage (Calcomp or microfilm). GAE has used the Universal Graphics Products know as UGL to replace the CA-DISSPLA and produce all the following graphics out and show the power of UGL for its CA-DISSPLA Compatibilities. The plot package added t o the code made extensive use of the general graphic data display programs developed at the Air Force Weapons Laboratory (AFWL) display program existing a t ARIL at the time the plot package was added to PUFF. Modifications to the AFWL data display program and to the graphics

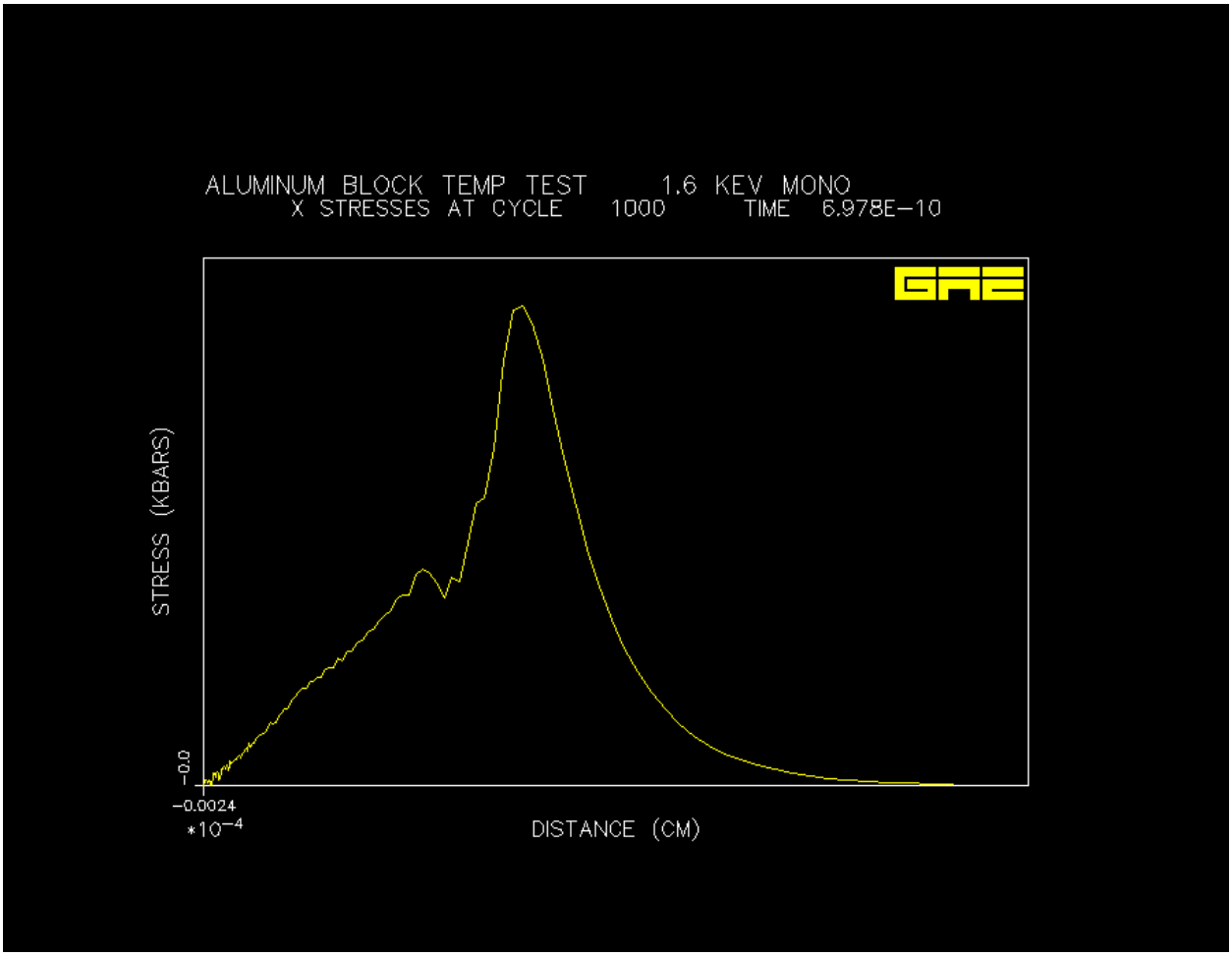
package i n the PUFF code have been made on a continuing basis t o improve the efficiency of the plotting procedures.

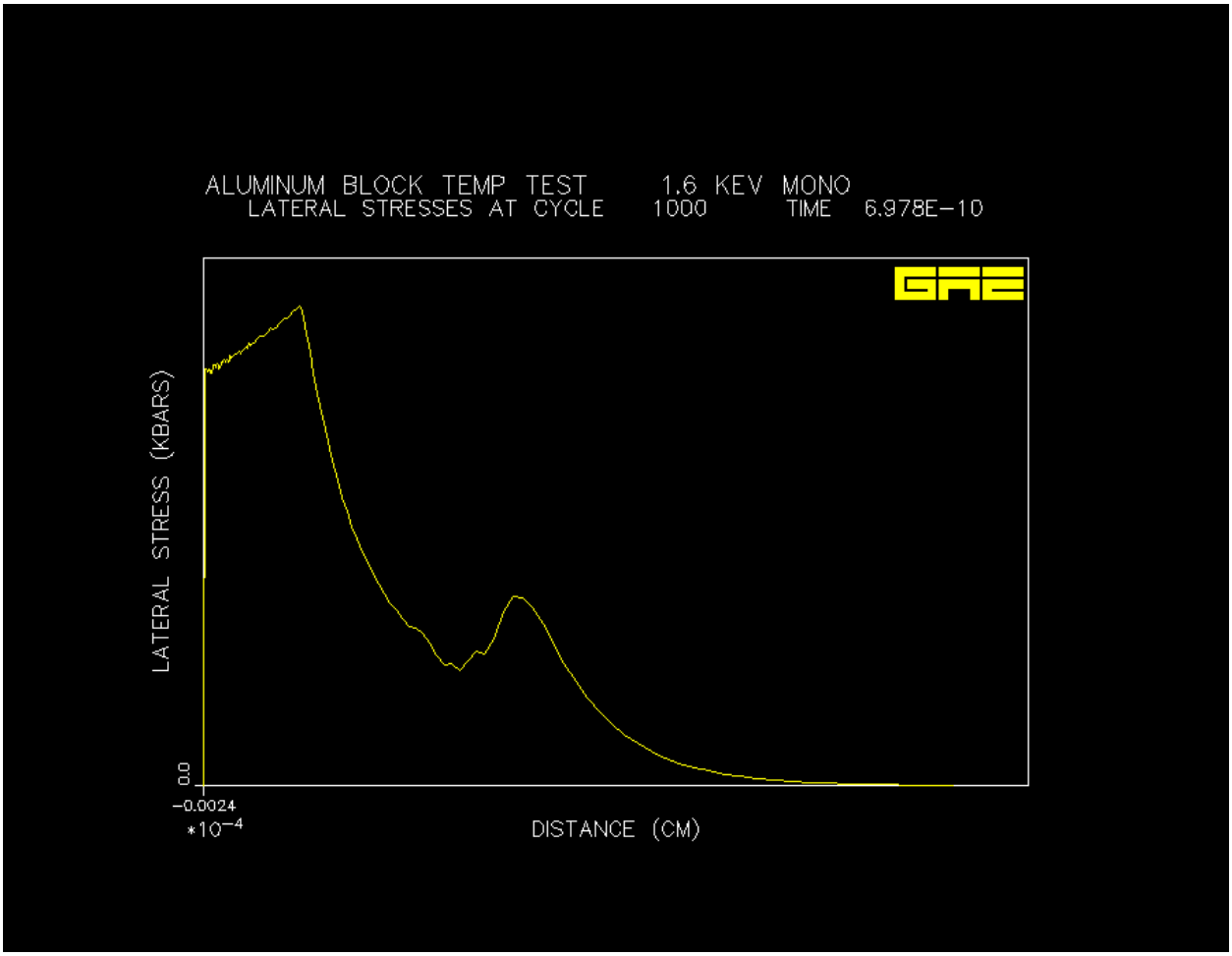
Galaxy Advanced Engineering, Inc. (GAE) has taken steps to produce the PC version, (i. e., **PUFF74/PC**). Currently the program is operating on IBM/PC or 100% compatibles under PC/DOS or MS/Windows95/98/2000/XP/ME and NT operating system. To order this code, please contact us at (650) 740-3244.

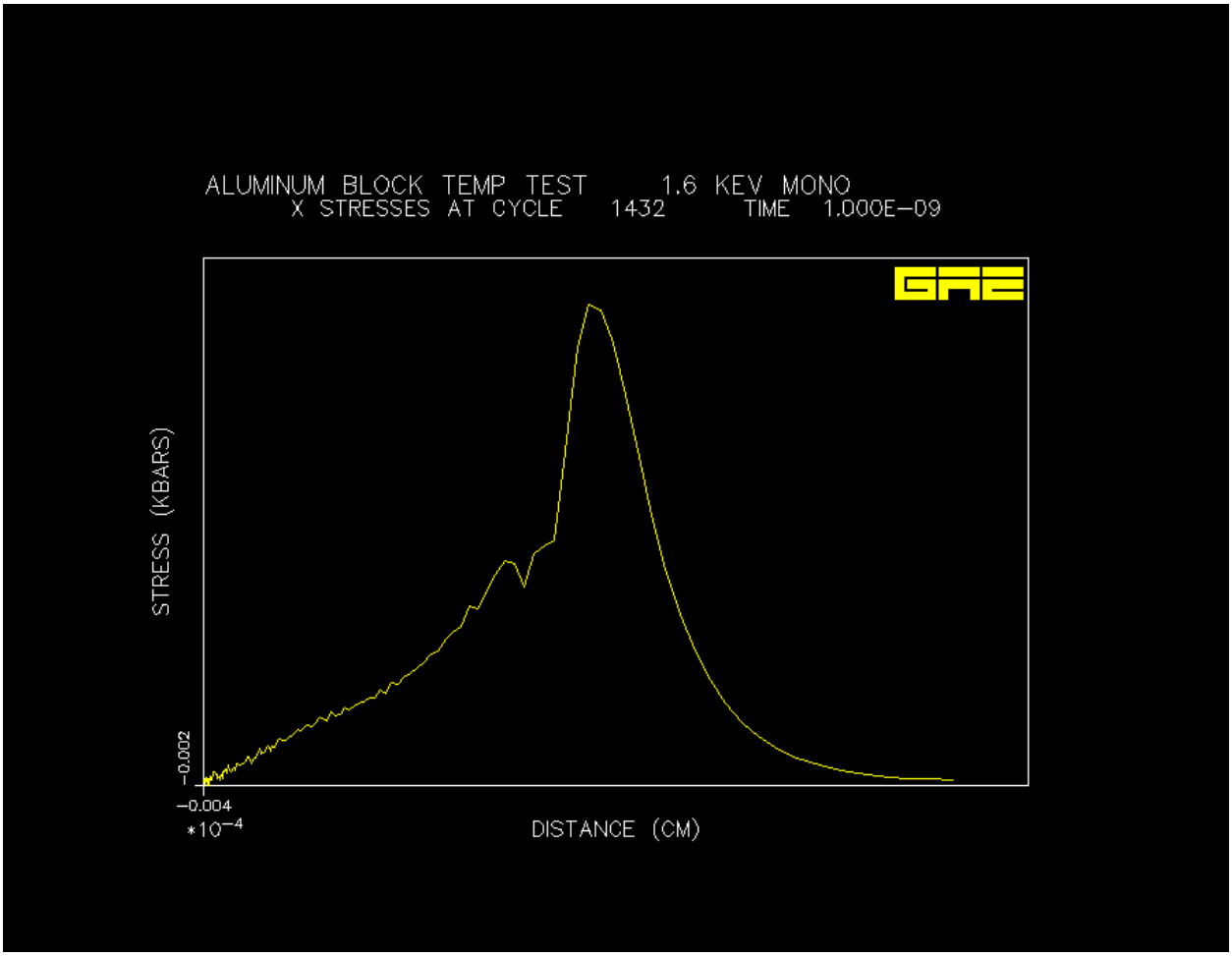
Following is random selection of graphics output of PUFF74/UGL combined.

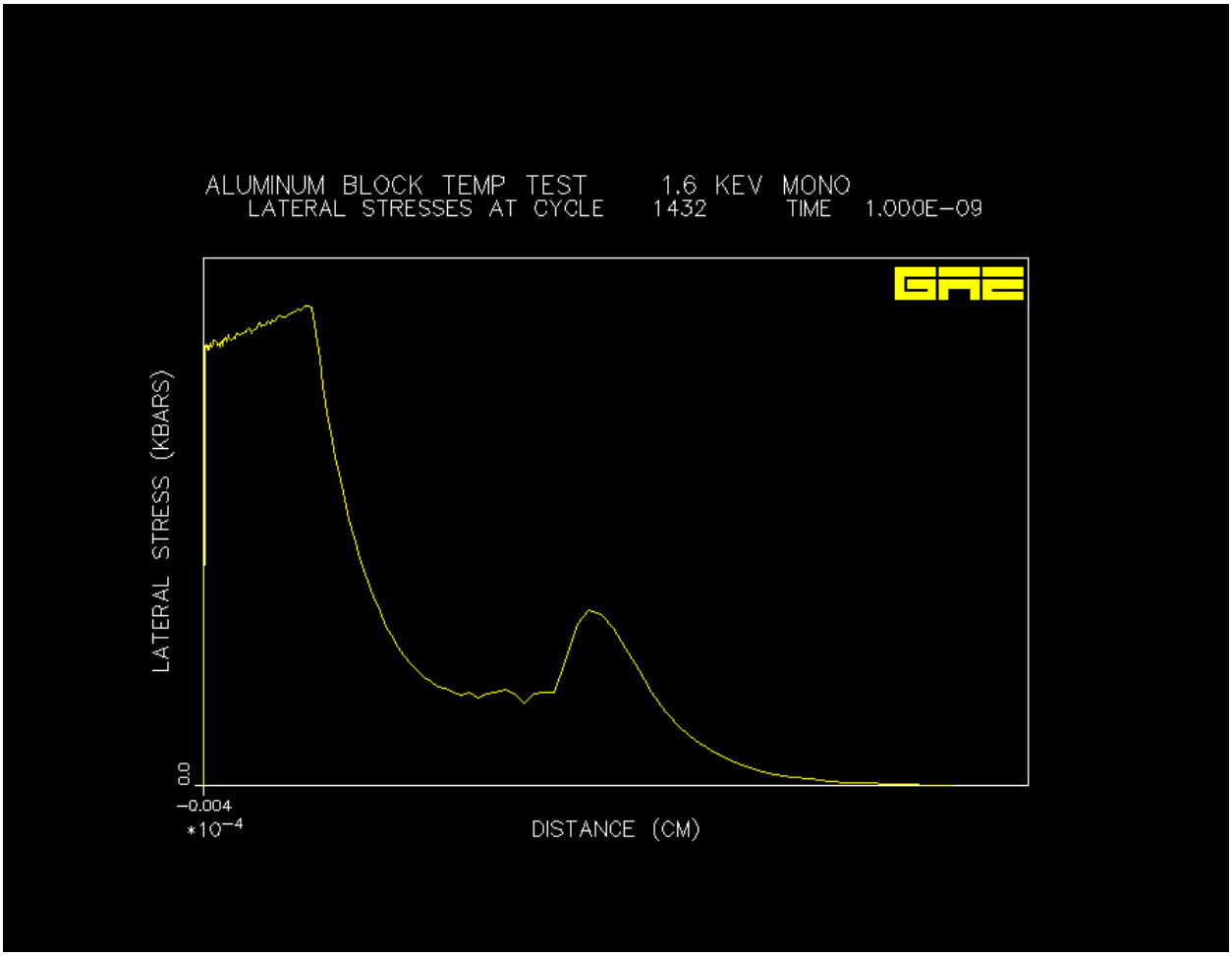


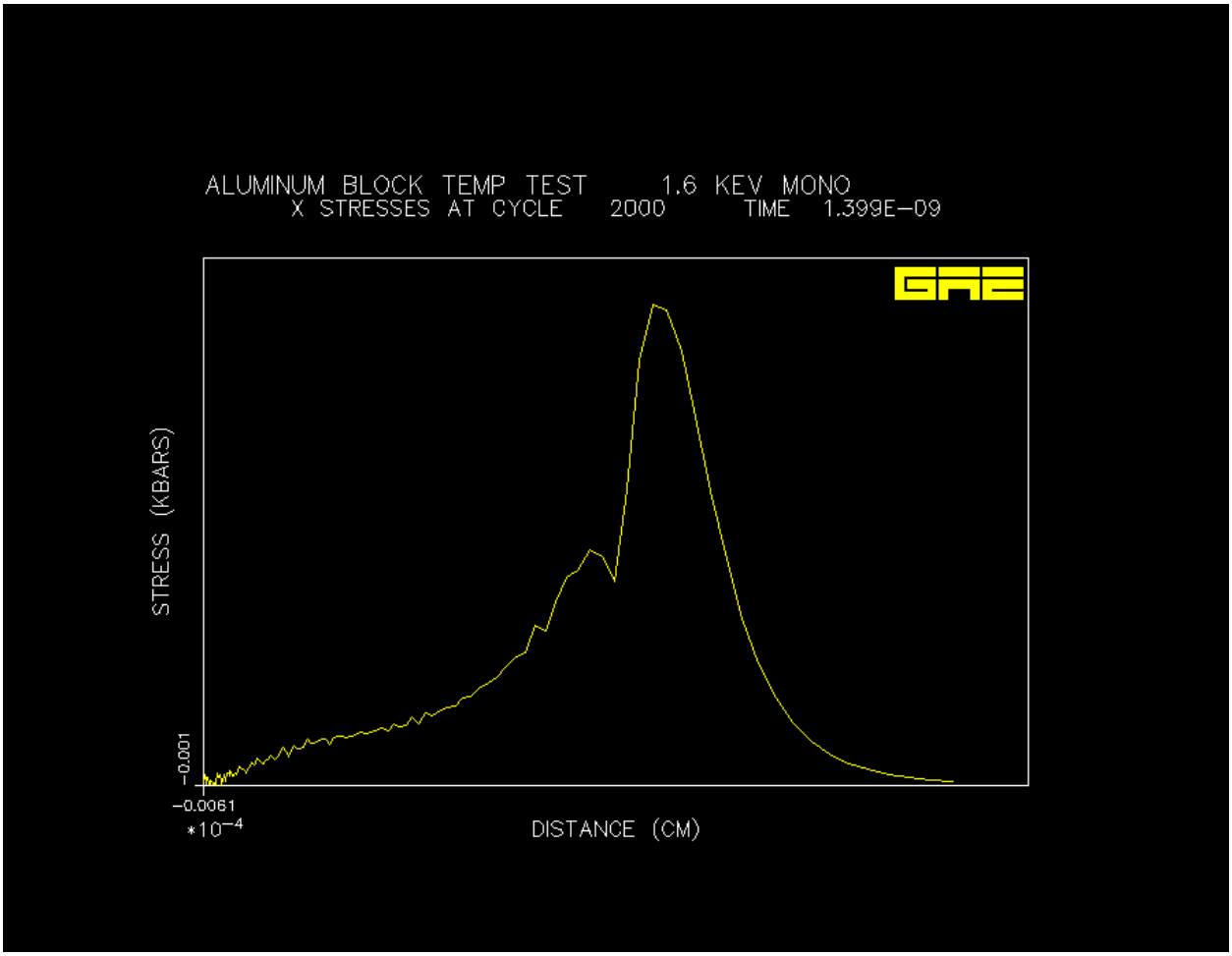

ALUMINUM BLOCK TEMP TEST 1.6 KEV MONO
CUMULATIVE DOSE VS DEPTH
GAE
DEPOSITION (CAL/GM)
0.0
0.0
*10-4
DEPTH (CM)


ALUMINUM BLOCK TEMP TEST 1.6 KEV MONO
X STRESSES AT CYCLE 1000 TIME 6.978E-10
GAE
STRESS (KBARS)
-0.0
-0.0024
*10-4
DISTANCE (CM)


ALUMINUM BLOCK TEMP TEST 1.6 KEV MONO
LATERAL STRESSES AT CYCLE 1000 TIME 6.978E-10
LATERAL STRESS (KBARS)
0.0
-0.0024
*10-4
DISTANCE (CM)


ALUMINUM BLOCK TEMP TEST 1.6 KEV MONO
X STRESSES AT CYCLE 1432 TIME 1.000E-09
STRESS (KBARS)
-0.002
-0.004
*10-4
DISTANCE (CM)


ALUMINUM BLOCK TEMP TEST 1.6 KEV MONO
LATERAL STRESSES AT CYCLE 1432 TIME 1.000E-09
GAE
LATERAL STRESS (KBARS)
0.0
-0.004
*10-4
DISTANCE (CM)


ALUMINUM BLOCK TEMP TEST 1.6 KEV MONO
X STRESSES AT CYCLE 2000 TIME 1.399E-09
GAE
STRESS (KBARS)
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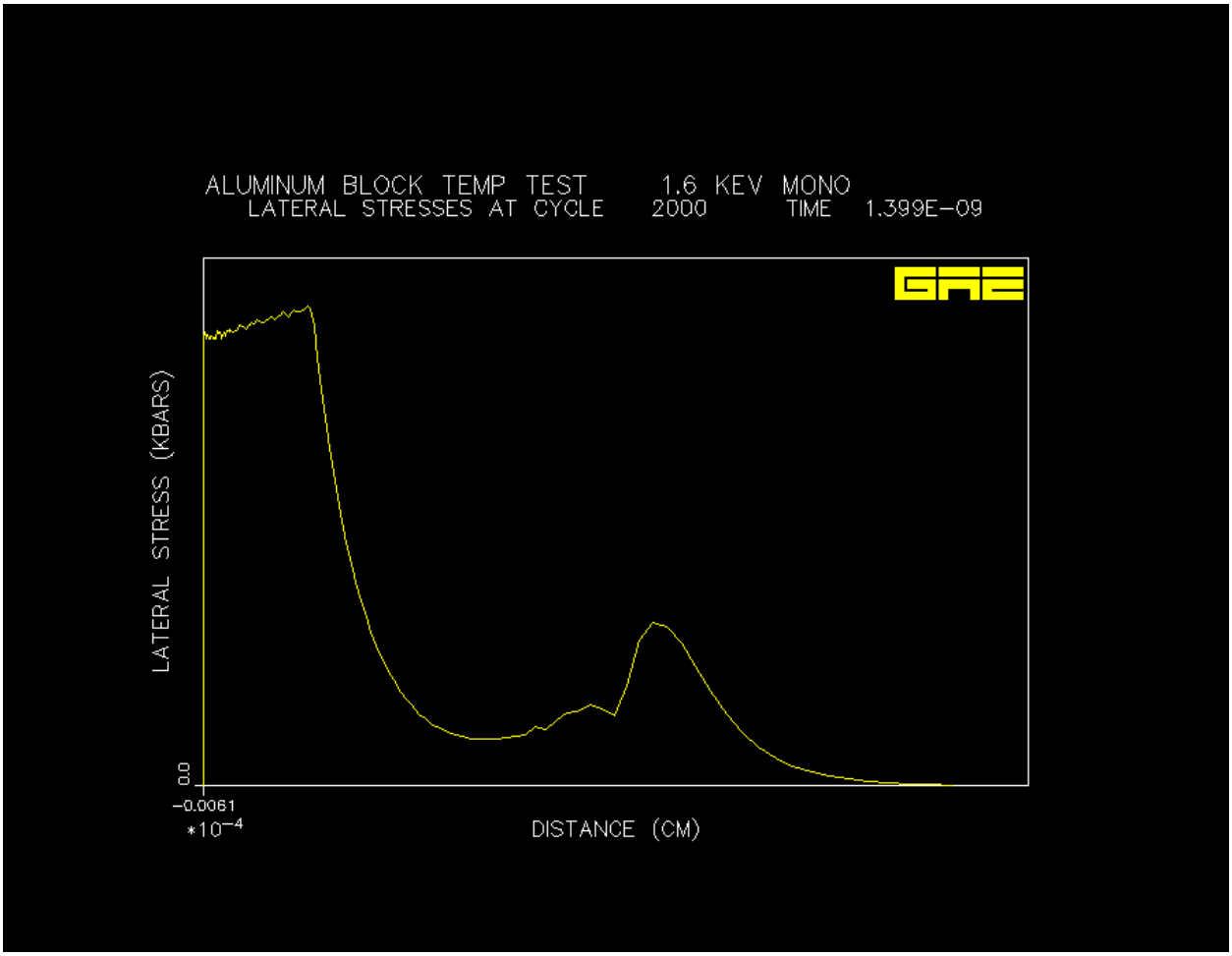
-0.0061
*10-4
DISTANCE (CM)


ALUMINUM BLOCK TEMP TEST 1.6 KEV MONO
LATERAL STRESSES AT CYCLE 2000 TIME 1.399E-09
LATERAL STRESS (KBARS)
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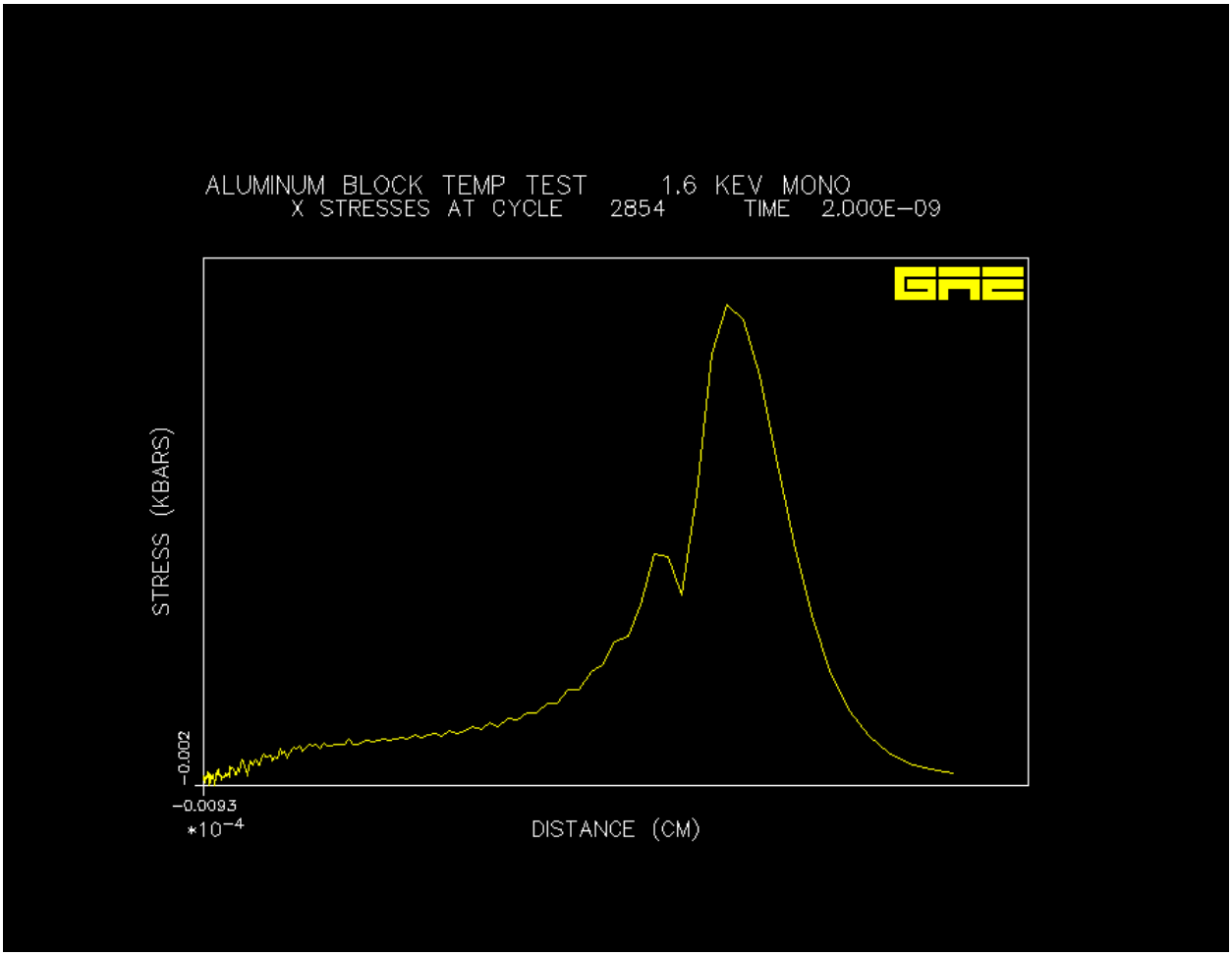
-0.0061
*10-4
DISTANCE (CM)


ALUMINUM BLOCK TEMP TEST 1.6 KEV MONO
X STRESSES AT CYCLE 2854 TIME 2.000E-09
GAE
STRESS (KBARS)
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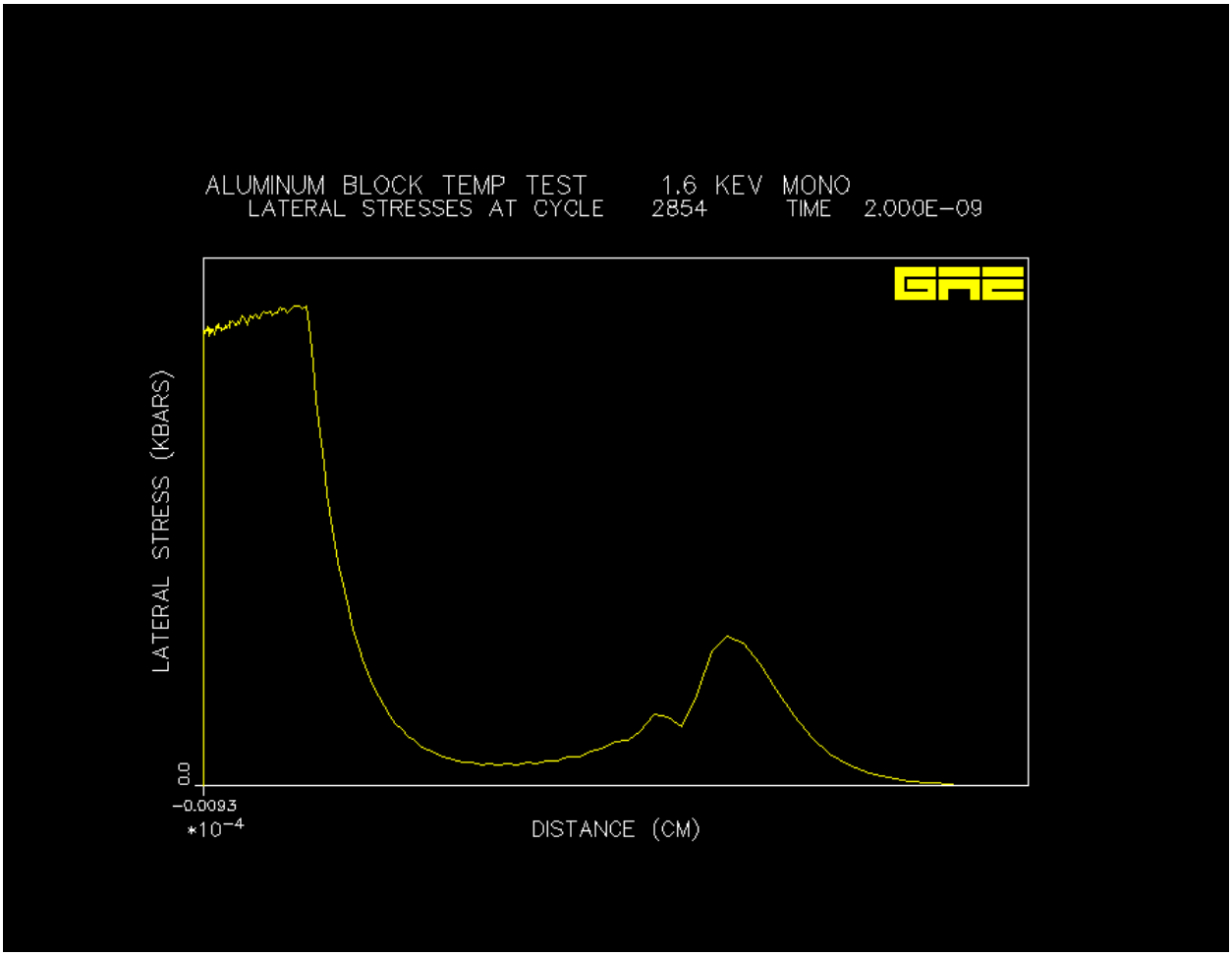
-0.0093
*10^-4
DISTANCE (CM)


ALUMINUM BLOCK TEMP TEST 1.6 KEV MONO
LATERAL STRESSES AT CYCLE 2854 TIME 2.000E-09
LATERAL STRESS (KBARS)
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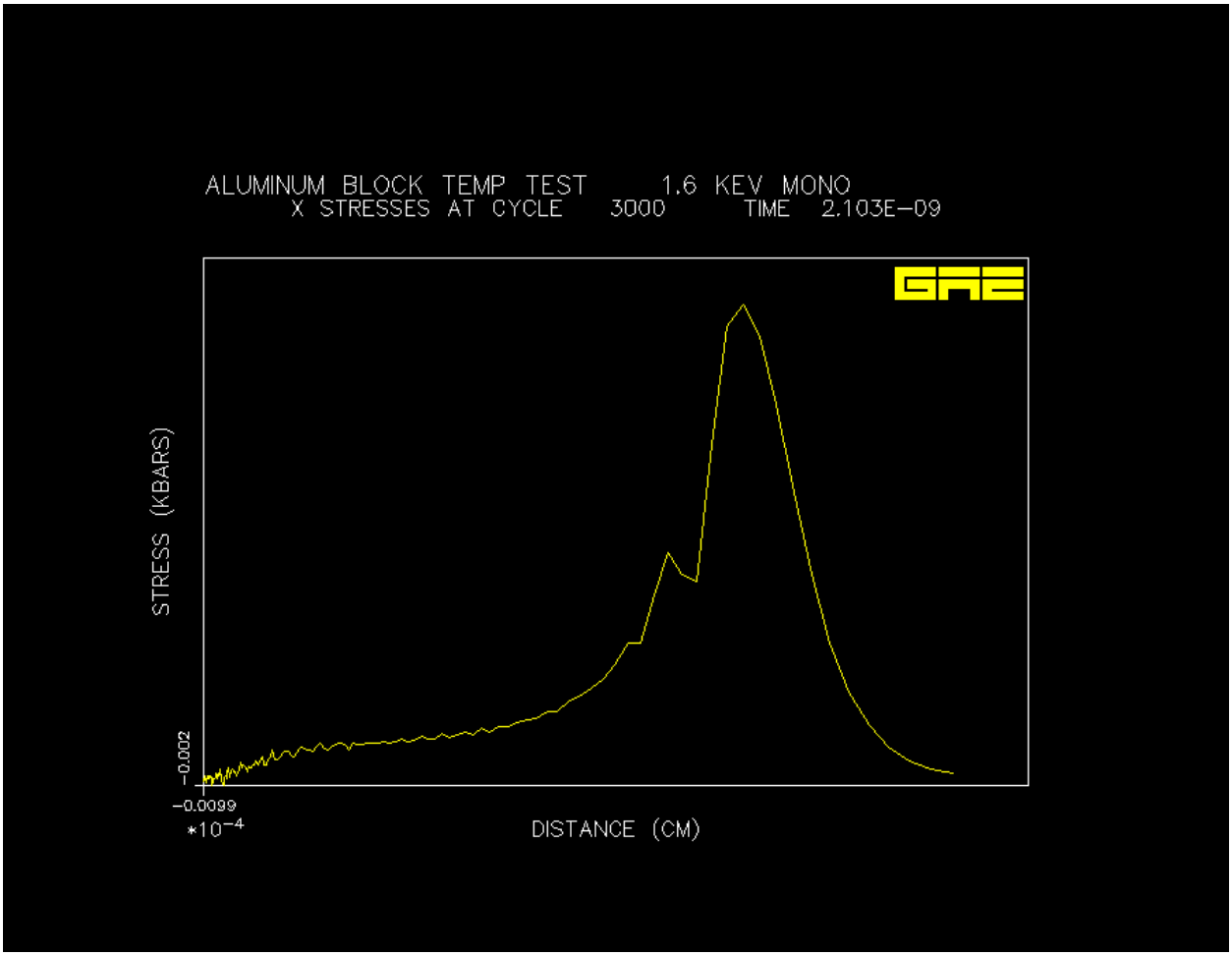
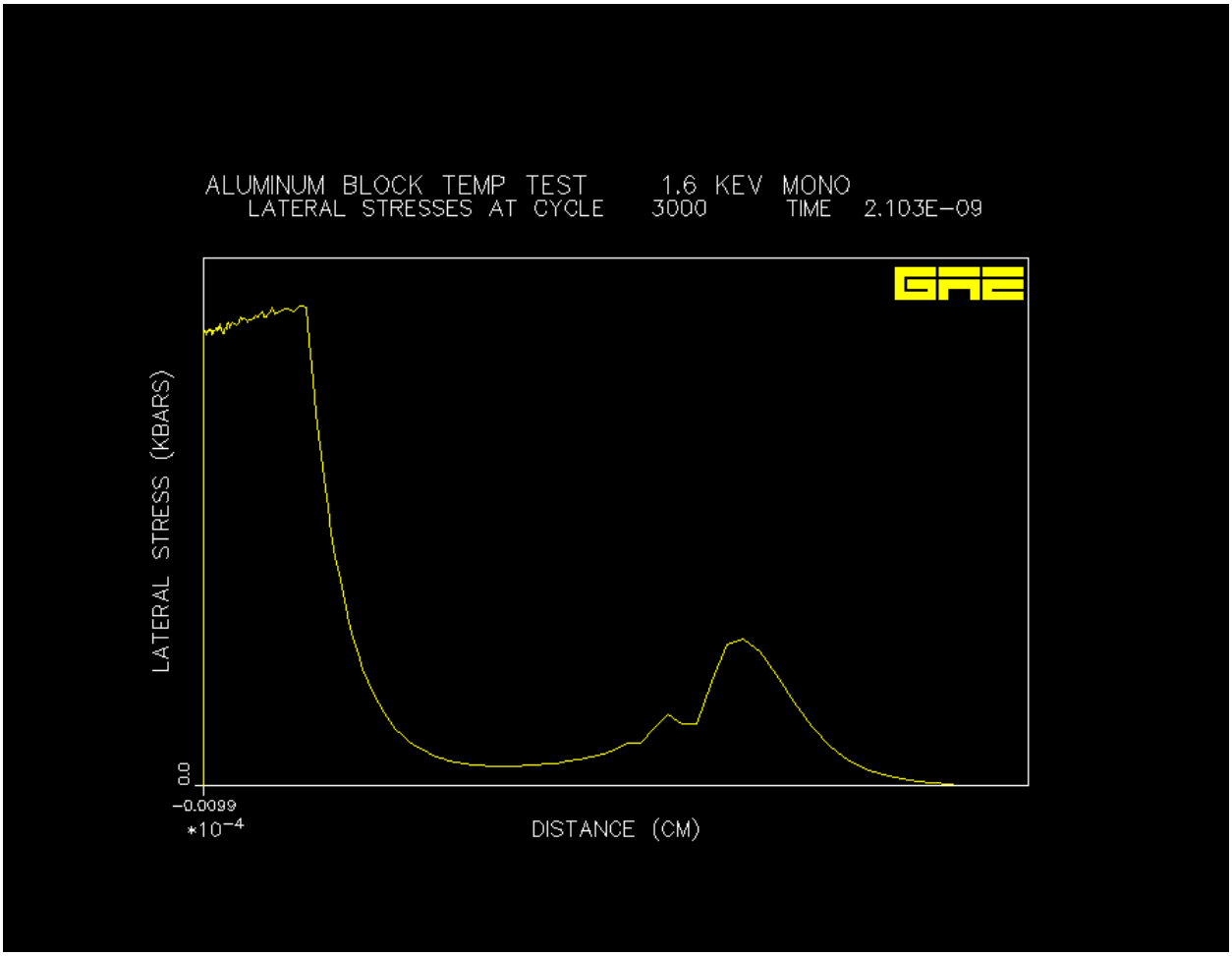
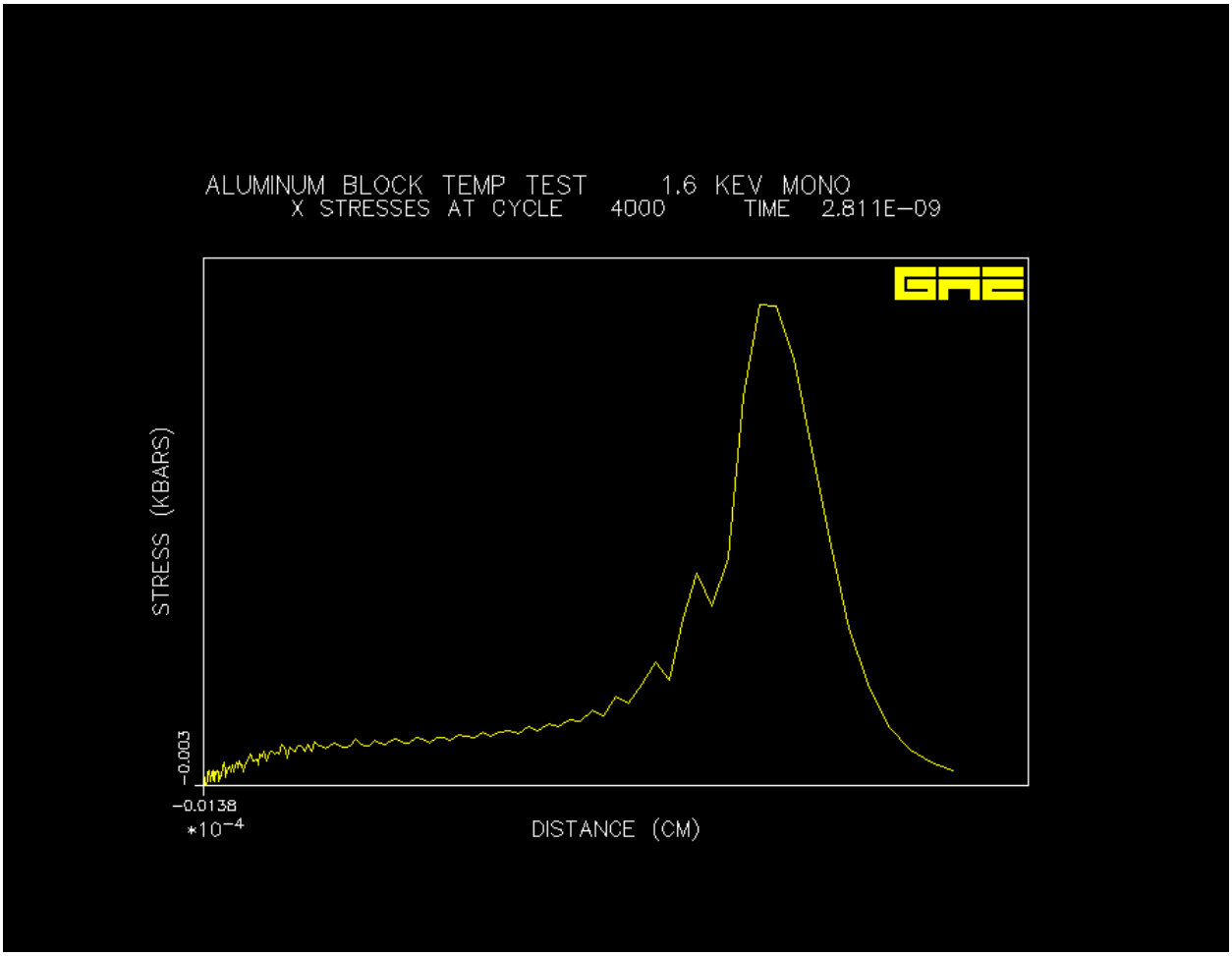
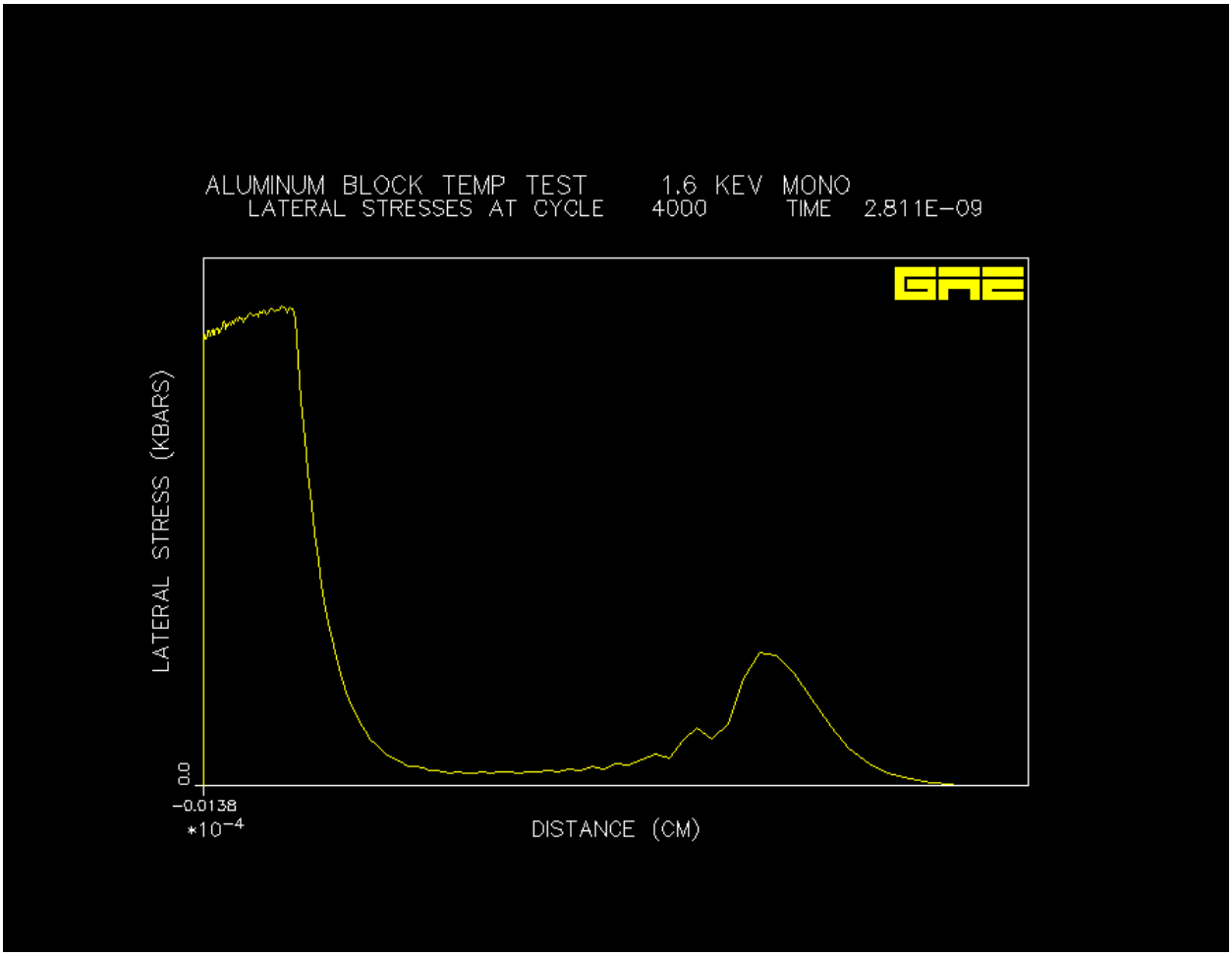
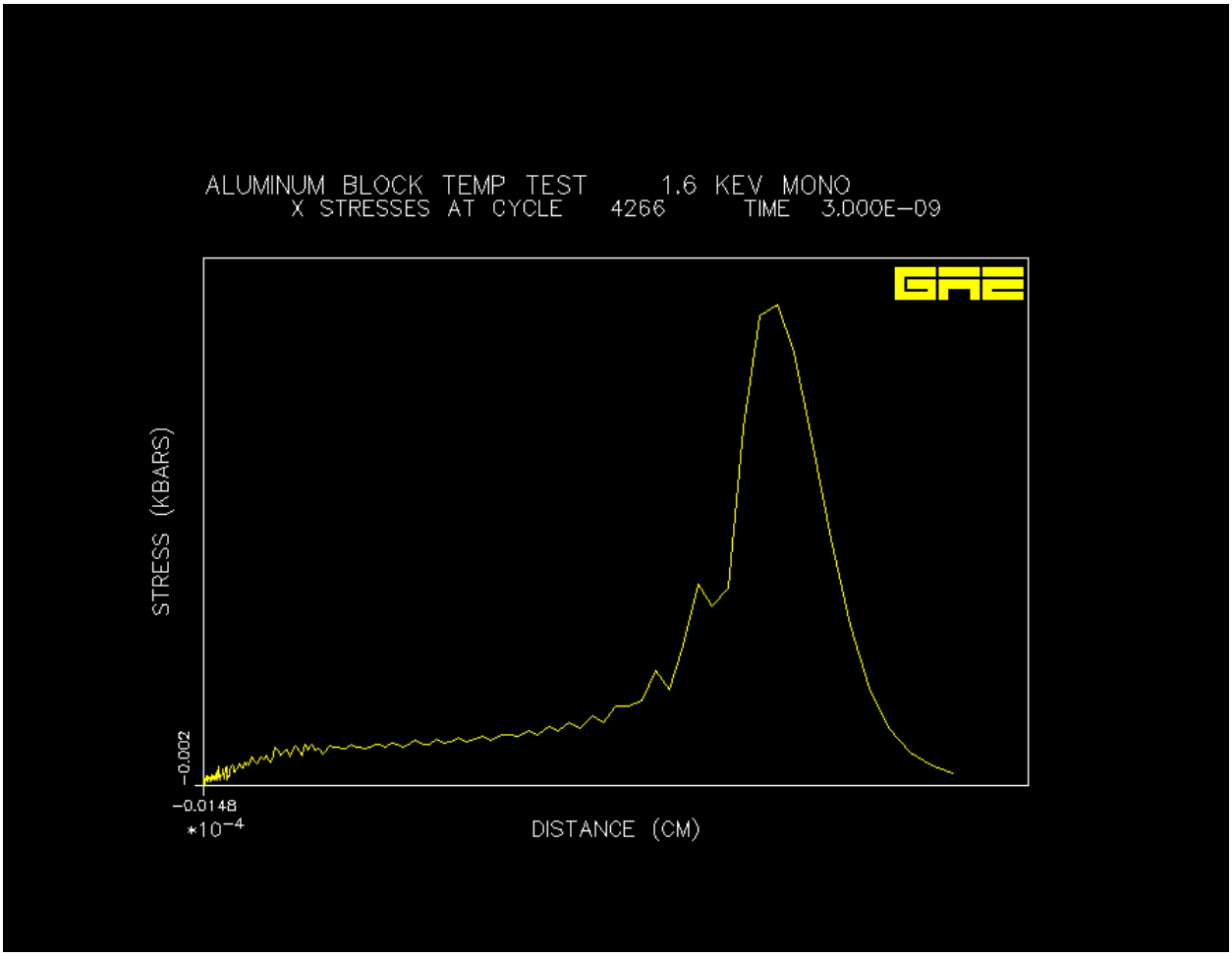
-0.0093
*10-4
DISTANCE (CM)

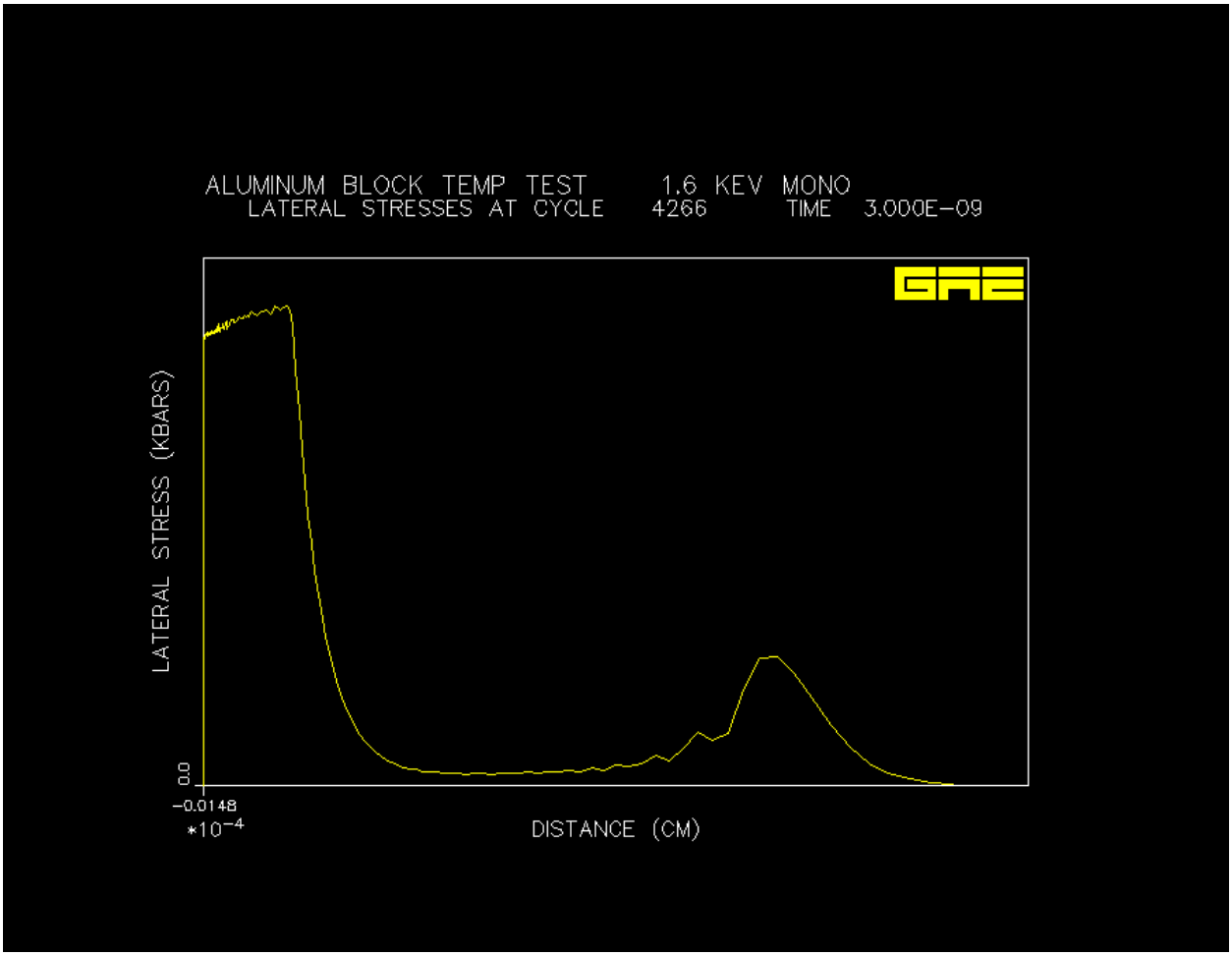

ALUMINUM BLOCK TEMP TEST 1.6 KEV MONO
X STRESSES AT CYCLE 3000 TIME 2.103E-09
GAE
STRESS (KBARS)
-0.002
-0.0099
*10-4
DISTANCE (CM)

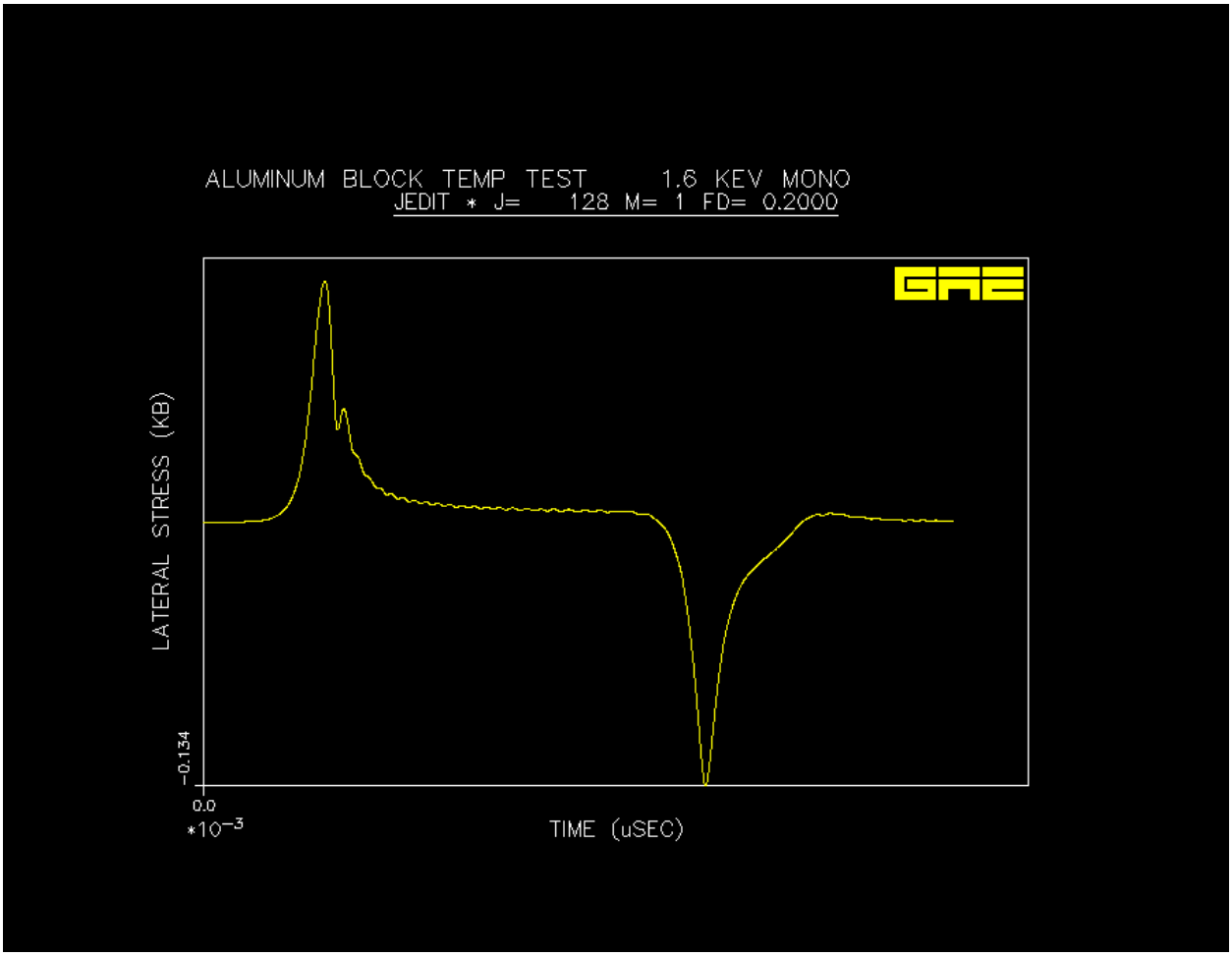

ALUMINUM BLOCK TEMP TEST 1.6 KEV MONO
LATERAL STRESSES AT CYCLE 3000 TIME 2.103E-09
LATERAL STRESS (KBARS)
0.0
-0.0099
*10-4
DISTANCE (CM)

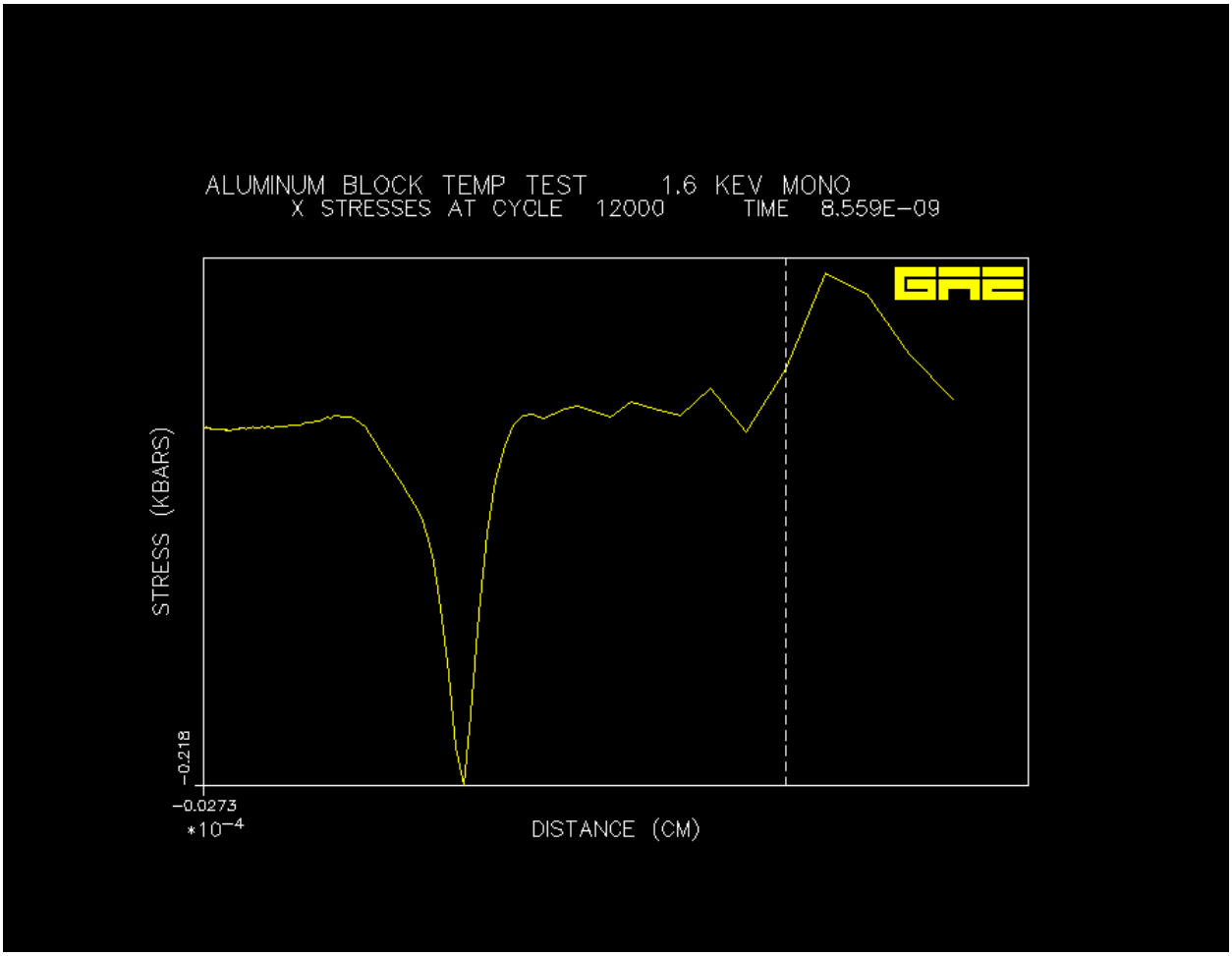

ALUMINUM BLOCK TEMP TEST 1.6 KEV MONO
X STRESSES AT CYCLE 4000 TIME 2.811E-09
GAE
STRESS (KBARS)
-0.003
-0.0138
*10-4
DISTANCE (CM)

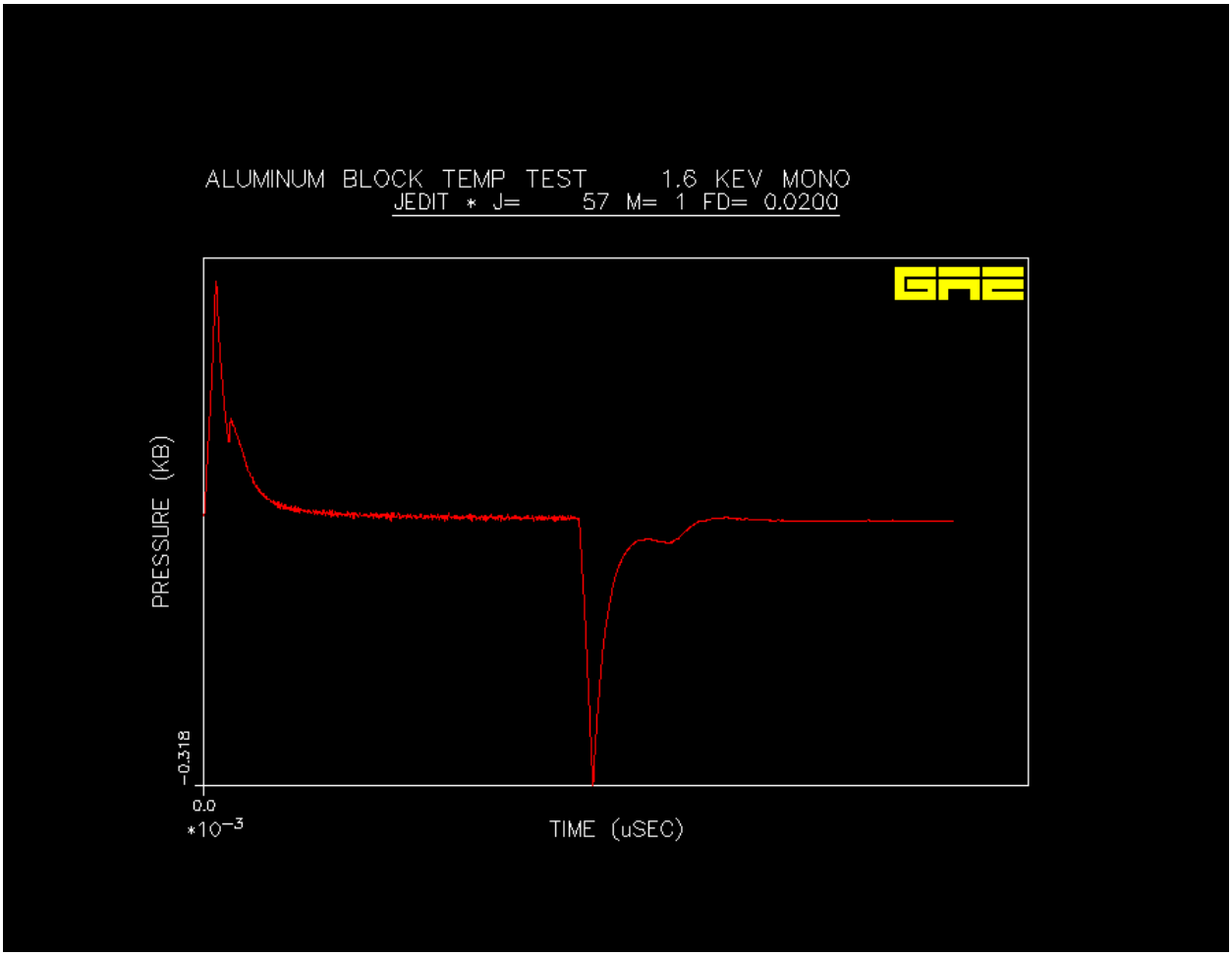

ALUMINUM BLOCK TEMP TEST 1.6 KEV MONO
LATERAL STRESSES AT CYCLE 4000 TIME 2.811E-09
LATERAL STRESS (KBARS)
0.0
-0.0138
*10-4
DISTANCE (CM)

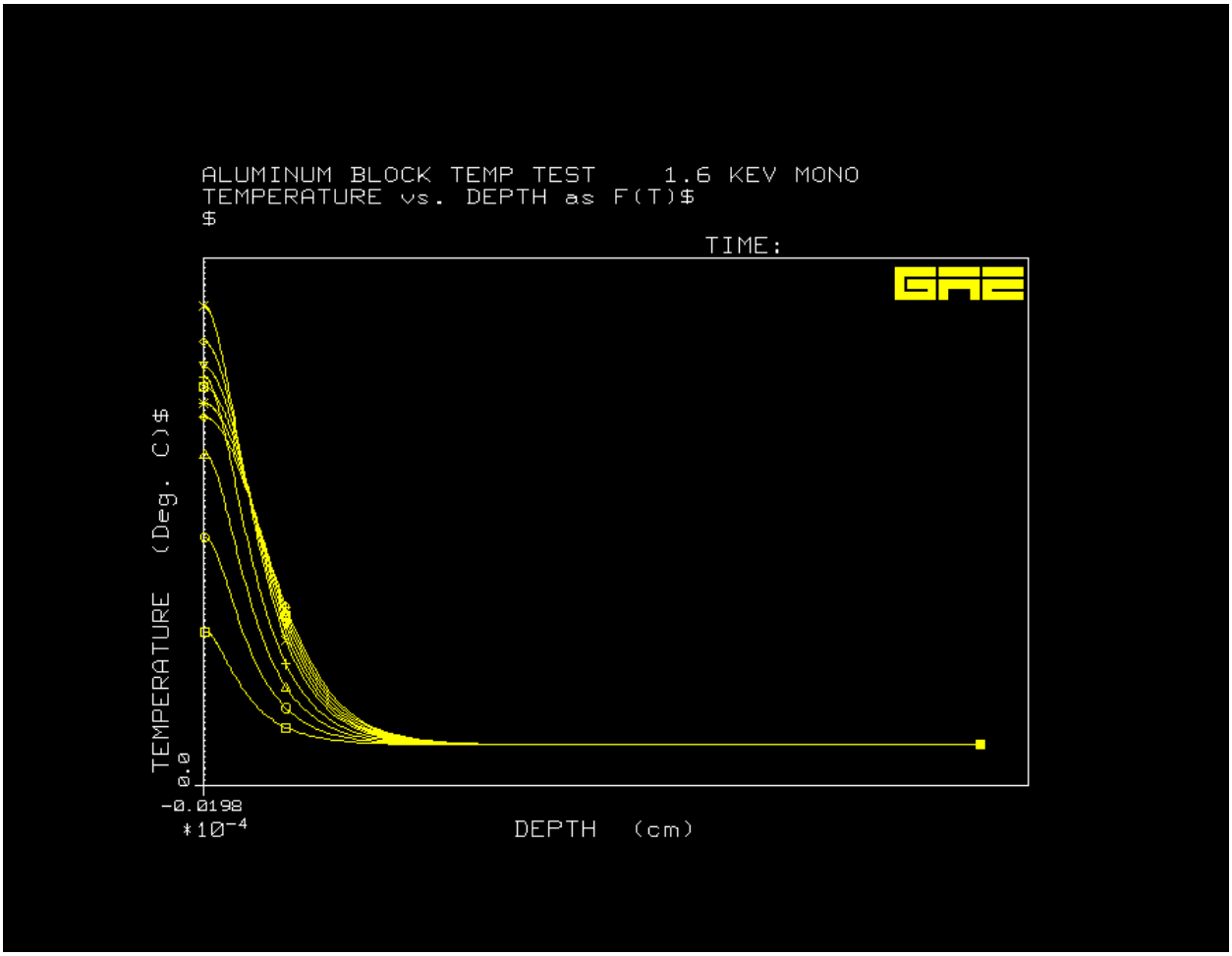

ALUMINUM BLOCK TEMP TEST 1.6 KEV MONO
X STRESSES AT CYCLE 4266 TIME 3.000E-09
GAE
STRESS (KBARS)
-0.002
-0.0148
*10-4
DISTANCE (CM)


ALUMINUM BLOCK TEMP TEST 1.6 KEV MONO
LATERAL STRESSES AT CYCLE 4266 TIME 3.000E-09
GAE
LATERAL STRESS (KBARS)
0.0
-0.0148
*10-4
DISTANCE (CM)


ALUMINUM BLOCK TEMP TEST 1.6 KEV MONO
JEDIT * J= 128 M= 1 FD= 0.2000
LATERAL STRESS (KB)
-0.134
0.0
*10-3
TIME (uSEC)


ALUMINUM BLOCK TEMP TEST 1.6 KEV MONO
X STRESSES AT CYCLE 12000 TIME 8.559E-09
STRESS (KBARS)
-0.218
-0.0273
*10-4
DISTANCE (CM)


ALUMINUM BLOCK TEMP TEST 1.6 KEV MONO
JEDIT * J= 57 M= 1 FD= 0.0200
PRESSURE (KB)
-0.318
0.0
*10-3
TIME (uSEC)


ALUMINUM BLOCK TEMP TEST 1.6 KEV MONO
TEMPERATURE vs. DEPTH as F(T)$
$
TIME:
GAE
TEMPERATURE (Deg. C)$
0.0
-0.0198
*10^-4
DEPTH (cm)