SN654 Vol 1

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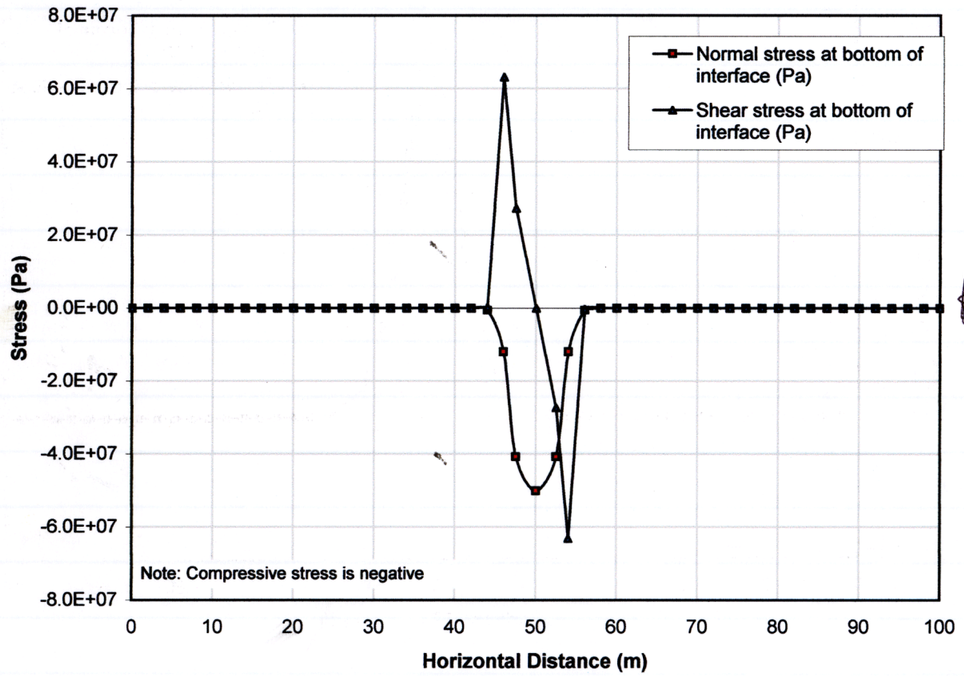
Case 7.2 - FLAC Results for a Horizontal Weak Interface Subjected to a Volumetric Heat Source



Sept 6/04

From EXCEL file F72.xls (Note zero stress where slip occurs.)

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SN654 Vol 1

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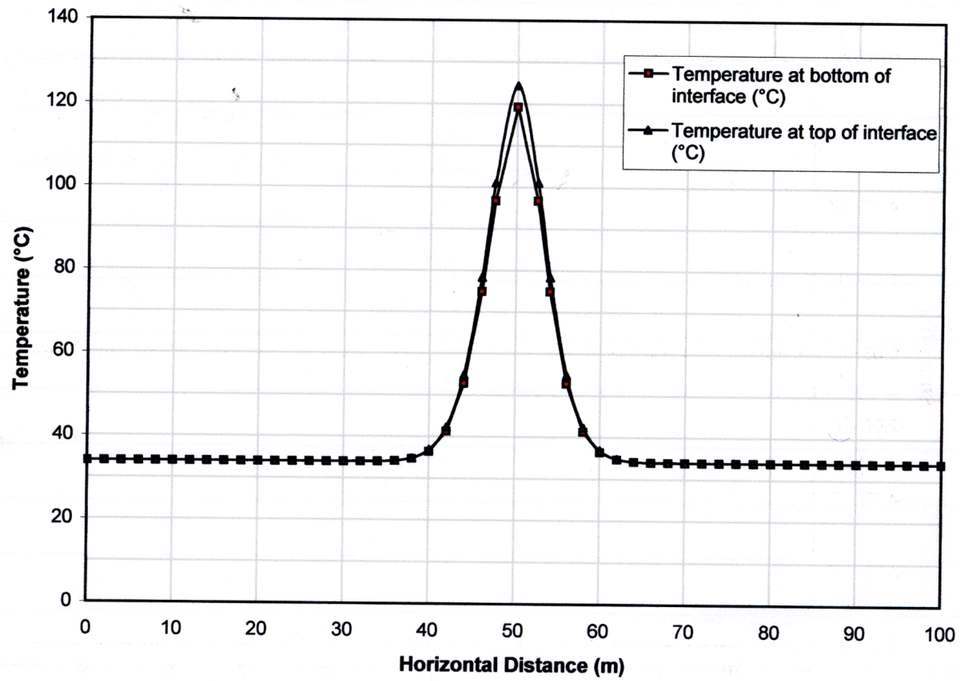
Case 7.2 - FLAC Results for a Horizontal Weak Interface Subjected to a Volumetric Heat Source



Sept 6/04

From EXCEL file F72.xls

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SN GSA Vol 1

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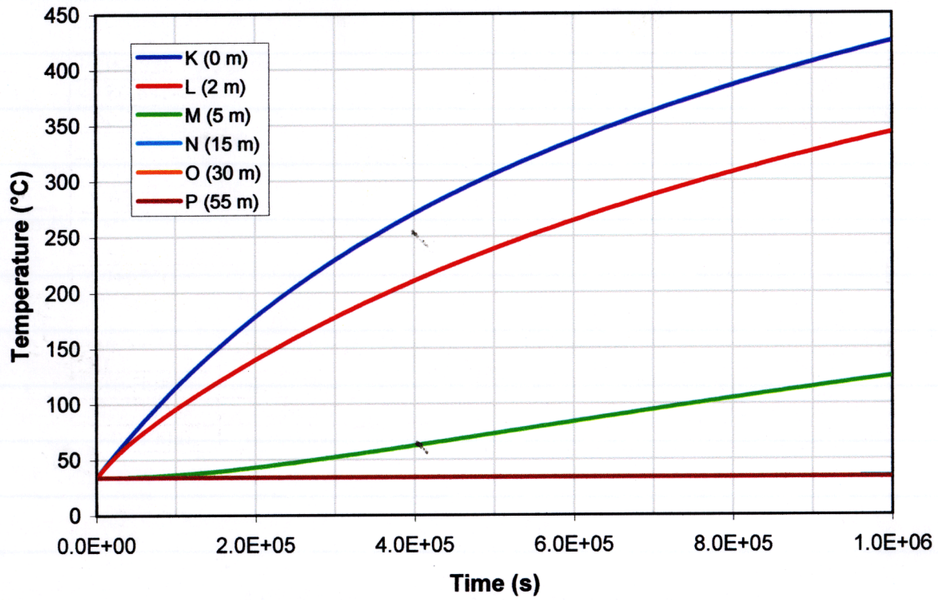
Sept 6/04

Case 7.2 - FLAC Results for a Horizontal Weak Interface Subjected to a Volumetric Heat Source



Sep 6/04

From G:\c F72TEMP.XLS (EXCEL)

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Sept. 6/04.

SN GSA Vol 1

Parameter	Max	Min
i	51	1
Y coordinate (m)	50	50
X coordinate (m)	100	0
Distance along interface (m)	100	0
Shear displacement at bottom of interface (m)	1.320E-02	-1.320E-02
Normal displacement at bottom of interface (m)	1.319E-02	-2.384E-03
Shear displacement at top of interface (m)	7.045E-03	-7.045E-03
Normal displacement at top of interface (m)	1.292E-02	7.385E-04
Relative normal displacement on interface (m)	7.211E-03	-2.637E-04
Relative shear displacement on interface (m)	1.103E-02	-1.103E-02
Temperature at bottom of interface (°C)	119.30	34.00
Temperature at top of interface (°C)	124.44	34.00
Total displacement at bottom of interface (m)	1.441E-02	1.328E-03
Theta at bottom of interface (°)	173.82	-178.05
Total displacement at top of interface (m)	1.301E-02	7.385E-04
Theta at top of interface (°)	123.40	56.60
Normal stress at bottom of interface (Pa)	0.000E+00	-5.010E+07
Shear stress at bottom of interface (Pa)	6.315E+07	-6.315E+07
Slip	-	-
Bond	-	-
Normal stress at top of interface (Pa)	0.000E+00	-5.010E+07
Shear stress at top of interface (Pa)	6.315E+07	-6.315E+07
Slip	-	-
Bond	-	-
Sratio at top of interface	2.27E-03	1.10E-05
Sratio at bottom of interface	2.86E-04	2.00E-06
Strength factor	2.11E+05	0.00E+00

Sep 6/04

Summary of results from Case 7.2 using FLAC
(from EXCEL G:\c F72.XLS.)

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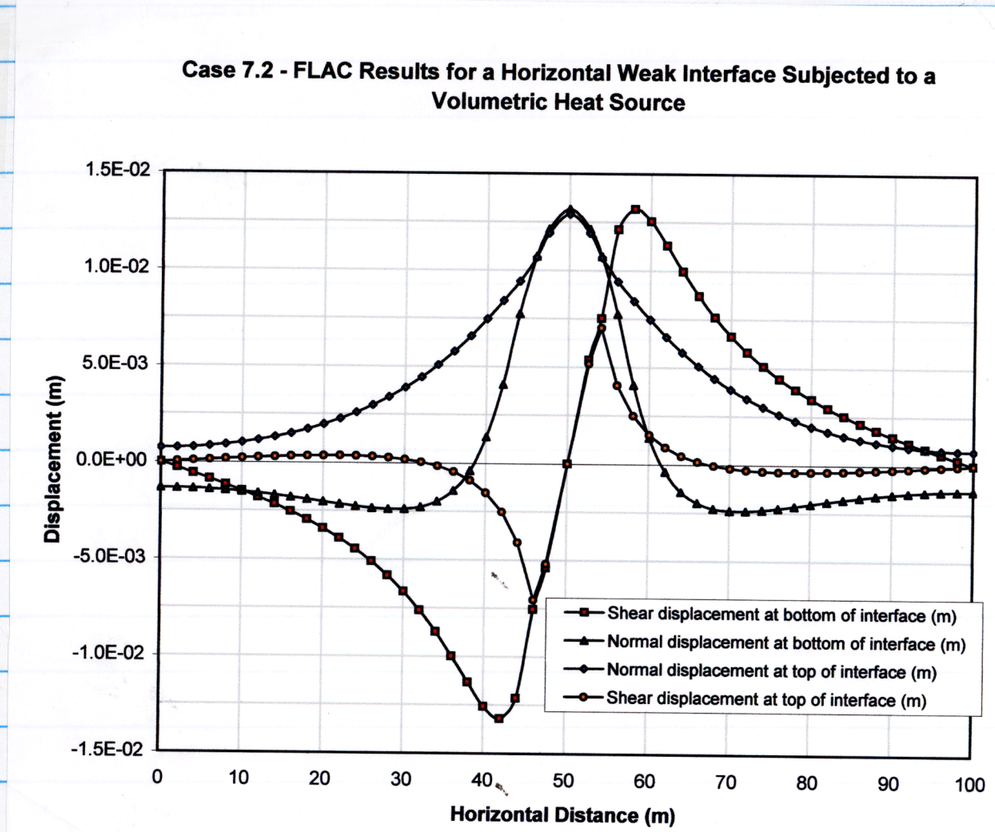
Sept 6/04



Sept 6/04

Displacements at top and bottom of interface (from EXCEL file FR.XLS).

End of FLAC case 7.2.

Sept 7/04

Start development of routine to create comparable UDEC plots to those on pages 190 - 196.

Sept 8/04.

- Continue development of UDEC routine to create data tables and facilitate plotting.
- conventions in UDEC for joint normal and shear stress are opposite those in FLAC. → convert to FLAC convention.

Sept 9/04 - Continue refinement of process to produce comparative plots outside of UDEC. Successfully included temperature query into FISH routine U71FILL.TXT. Data dumped to ASCII File, then imported to EXCEL spreadsheet after sorting manually in EXCEL by block and x-coordinate. Data imported to U71.XLS.

File U71FILL.TXT is attached to page 197

Note: There is no simple way to export slip condition, except to change jcons = 5 and use flag for bond breakage as indicator. Modify U71FILL.TXT to accomodate querying the flag to track slip. This is under FISH routine JMAT.FIN. variable $rs_frac (index 18).

Modified U71INPUT.TXT to include relevant plots and to create total displacement contours. Also modified U71FILL.TXT to export slip variable. Changed joint constitutive model to jcons = 5. to access slip variable.

SN654 Vol1

```
def xxx
  nn=2000
end
xxx
def table_fill
  array u71c(12,nn)
  array u71b(9,nn)
  ic=contact_head
  ib=block_head
  ii=1
  thvalr=thvald*pi/180.0
  mval=tan(thvalr)
  bval=50.0-50.0*mval
;
; Contact information
;
  loop while ic # 0
    xval=c_x(ic)
    yval=c_y(ic)
    ycal=mval*xval+bval
    lval=sqrt(xval^2+(yval-bval)^2)
    blk1=c_b1(ic)
    blk2=c_b2(ic)
    clval=c_length(ic)
    dclos=c_ndis(ic)
    dride=c_sdis(ic)
    nfval=c_nforce(ic)
    sfval=c_sforce(ic)
    nsval=-nfval/clval
    ssval=-sfval/clval
    tyval=c_type(ic)
;
; Create table entries
;
   if abs(yval-ycal)<0.1 then
    table(1,ii)=yval
    table(2,ii)=xval
    table(3,ii)=lval
    table(4,ii)=blk1
    table(5,ii)=blk2
    table(6,ii)=nfval
    table(7,ii)=sfval
    table(8,ii)=dclos
    table(9,ii)=dride
    table(10,ii)=nsval
    table(11,ii)=ssval
    table(12,ii)=tyval
;
; Array entries
;
    u71c(1,ii)=string(yval)
    u71c(2,ii)=string(xval)
    u71c(3,ii)=string(lval)
    u71c(4,ii)=string(blk1)
    u71c(5,ii)=string(blk2)
    u71c(6,ii)=string(nfval)
    u71c(7,ii)=string(sfval)
    u71c(8,ii)=string(dclos)
    u71c(9,ii)=string(dride)
    u71c(10,ii)=string(nsval)
    u71c(11,ii)=string(ssval)
    u71c(12,ii)=string(tyval)
    ii=ii+1
   end_if
   ic=c_next(ic)
  end_loop
  ii=1
;
; Gridpoints on joint
;
  loop while ib # 0
    cg=b_gp(ib)
    loop while cg # 0
      blkc=ib
      xval=gp_x(cg)
      yval=gp_y(cg)
      ycal=mval*xval+bval
      lval=sqrt(xval^2+(yval-bval)^2)
      dxval=gp_xdis(cg)
      dyval=gp_ydis(cg)
      dsval=dxval*cos(thvalr)-dyval*sin(thvalr)
      dnval=dxval*sin(thvalr)+dyval*cos(thvalr)
      gtemp=fmem(cg+$kgtemp)
;
; Create table entries
;
      if abs(yval-ycal)<0.1 then
        table(13,ii)=yval
        table(14,ii)=xval
        table(15,ii)=lval
        table(16,ii)=blkc
        table(17,ii)=dxval
        table(18,ii)=dyval
        table(19,ii)=dsval
        table(20,ii)=dnval
;
; Array entries
;
        u71b(1,ii)=string(yval)
        u71b(2,ii)=string(xval)
        u71b(3,ii)=string(lval)
        u71b(4,ii)=string(blkc)
        u71b(5,ii)=string(dxval)
        u71b(6,ii)=string(dyval)
        u71b(7,ii)=string(dsval)
        u71b(8,ii)=string(dnval)
        u71b(9,ii)=string(gtemp)
        ii=ii+1
      end_if
      cg=gp_next(cg)
    end_loop
    ib=b_next(ib)
  end_loop
  status=open('u71cdata.out',1,1)
  status=write(u71c,2000)
  status=close
  status=open('u71bdata.out',1,1)
  status=write(u71b,2000)
end
;
set thvald=0.0
cal block.fin
cal contact.fin
table_fill
ret
```

Sep 9/04

File U71FILL.TXT
(first draft)

This file was the first attempt at producing comparable UDEC plots. It was modified as shown on page 199, to include variable SLIPC.

Sep 9/04

SN654 Vol1

```
def xxx
  nn=2000
end
xxx
def table_fill
  array u71c(13,nn)
  array u71b(9,nn)
  ic=contact_head
  ib=block_head
  ii=1
  thvalr=thvald*pi/180.0
  mval=tan(thvalr)
  bval=50.0-50.0*mval
;
; Contact information
;
  loop while ic # 0
    xval=c_x(ic)
    yval=c_y(ic)
    ycal=mval*xval+bval
    lval=sqrt(xval^2+(yval-bval)^2)
    blk1=c_b1(ic)
    blk2=c_b2(ic)
    clval=c_length(ic)
    dclos=c_ndis(ic)
    dride=c_sdis(ic)
    nfval=c_nforce(ic)
    sfval=c_sforce(ic)
    nsval=-nfval/clval
    ssval=-sfval/clval
    tyval=c_type(ic)
    slipc=fmem(c_jex(ic)+$rs_frac)
;
; Create table entries
;
   if abs(yval-ycal)<0.1 then
    table(1,ii)=yval
    table(2,ii)=xval
    table(3,ii)=lval
    table(4,ii)=blk1
    table(5,ii)=blk2
    table(6,ii)=nfval
    table(7,ii)=sfval
    table(8,ii)=dclos
    table(9,ii)=dride
    table(10,ii)=nsval
    table(11,ii)=ssval
    table(12,ii)=tyval
    table(13,ii)=slipc
;
; Array entries
;
    u71c(1,ii)=string(yval)
    u71c(2,ii)=string(xval)
    u71c(3,ii)=string(lval)
    u71c(4,ii)=string(blk1)
    u71c(5,ii)=string(blk2)
    u71c(6,ii)=string(nfval)
    u71c(7,ii)=string(sfval)
    u71c(8,ii)=string(dclos)
    u71c(9,ii)=string(dride)
    u71c(10,ii)=string(nsval)
    u71c(11,ii)=string(ssval)
    u71c(12,ii)=string(tyval)
    u71c(13,ii)=string(slipc)
    ii=ii+1
   end_if
   ic=c_next(ic)
  end_loop
  ii=1
;
; Gridpoints on joint
;
  loop while ib # 0
    cg=b_gp(ib)
    loop while cg # 0
      blkc=ib
      xval=gp_x(cg)
      yval=gp_y(cg)
      ycal=mval*xval+bval
      lval=sqrt(xval^2+(yval-bval)^2)
      dxval=gp_xdis(cg)
      dyval=gp_ydis(cg)
      dsval=dxval*cos(thvalr)-dyval*sin(thvalr)
      dnval=dxval*sin(thvalr)+dyval*cos(thvalr)
      gtemp=fmem(cg+$kgtemp)
;
; Create table entries
;
      if abs(yval-ycal)<0.1 then
        table(13,ii)=yval
        table(14,ii)=xval
        table(15,ii)=lval
        table(16,ii)=blkc
        table(17,ii)=dxval
        table(18,ii)=dyval
        table(19,ii)=dsval
        table(20,ii)=dnval
;
; Array entries
;
        u71b(1,ii)=string(yval)
        u71b(2,ii)=string(xval)
        u71b(3,ii)=string(lval)
        u71b(4,ii)=string(blkc)
        u71b(5,ii)=string(dxval)
        u71b(6,ii)=string(dyval)
        u71b(7,ii)=string(dsval)
        u71b(8,ii)=string(dnval)
        u71b(9,ii)=string(gtemp)
        ii=ii+1
      end_if
      cg=gp_next(cg)
    end_loop
    ib=b_next(ib)
  end_loop
  status=open('u71cdata.out',1,1)
  status=write(u71c,2000)
  status=close
  status=open('u71bdata.out',1,1)
  status=write(u71b,2000)
end
;
set thvald=0.0
;cal block.fin
cal contact.fin
cal jmat.fin
table_fill
ret
```

Sep 9/04

File U71FILL.TXT
(final draft)

This file was run in conjunction with U71INPUT.TXT to reproduce Case 7.1 using UDEC, but with new plots and export to EXCEL file U71.XLS.

Sep 9/04

SNGSA Vol 1

This scientific notebook is continued in scientific notebook. SN 673 controlled by CNWRA. The remainder of the work conducted for Task 02 SubContract 499883N is contained in that scientific notebook.

September 9/2004

I have reviewed this scientific notebook and find it in agreement with QAP-001.

4-15-05