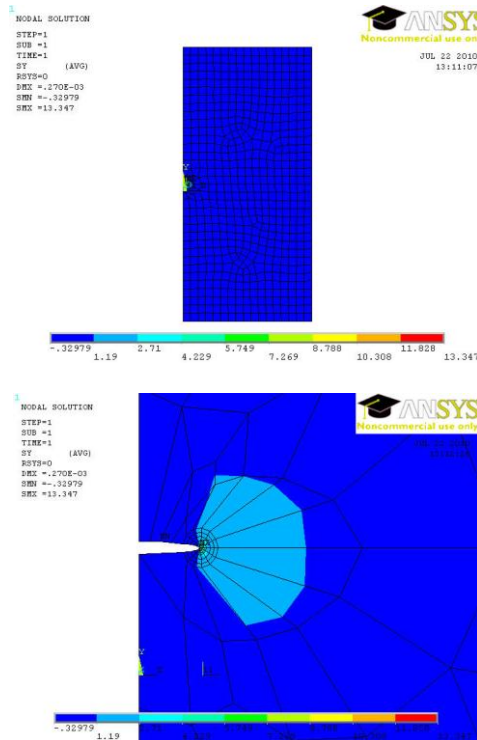


The macro of mode-I central crack for Circular Zone model

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!!! This macro is used to solve mode-I central crack problems in a

!!! semi-infinite strip under uniform tension loadings.

!!! The parameters/variables taken by the macro are:

!!! P : Uniform tension loading

!!! CR_L : Crack length

!!! WW : Plate width

!!! HH: 1/2 height of plate

!!! NEL_THET : Elements numbers at θ angle direction

!!! NEL_R : Elements numbers at radial direction

!!! CRFACE_LESIZE : Elements distribution ratio in the crack surface

!!! R_SIZE_RATIO : Distance ratio between elements at radial direction of crack
! zone

!!! R_F : Size of first circular element in the crack zone

!!! R_F1 : Size of three circular elements in the crack zone

!!! R_C : Size of crack zone at radial direction

P=1

CR_L=1

WW=40

HH=40

```
NEL_THET=3
NEL_R=6
CRFACE_LESIZE=0.2
R_SIZE_RATIO=2
R_F=0.03
R_F1=R_F*3
R_C=R_F1+(NEL_R-3)*R_F* R_SIZE_RATIO
TO_1= CR_L/10E6
TO=CR_L- TO_1
/PREP7
ET,1,PLANE82
MP,EX,1,30E4
MP,NUXY,1,0.3
K,1,
K,2,,HH
K,3,WW,HH
K,4,WW
CYL4,CR_L,,,,R_F1,180
CYL4,CR_L,, R_F1,,R_C,180
NUMMRG,KP
L,9,1
L,1,2
L,2,3
L,3,4
L,4,8
AL,4,6,8,9,10,11
APLOT
```

```
ASEL,NONE
LSEL,NONE
KSEL,NONE
K,10,
K,11,,-HH
K,12,WW,-HH
K,13,WW
CYL4,CR_L,,,180,R_F1,360
CYL4,CR_L,,R_F1,180,R_C,360
NUMMRG,KP
L,17,10
L,10,11
L,11,12
L,12,13
L,13,18
AL,15,17,19,20,21,22
APLOT
ALLSEL
KSEL,,LOC,Y,- TO_1, TO_1
KSEL,U,LOC,X,- TO_1, TO
NUMMRG,KP
ALLSEL,,KP
APLOT
ESIZE,2.4
KWPAVE, 7
WPRO,,,90.000000
FLST,2,4,5,ORDE,4
```

FITEM,2,1
FITEM,2,-2
FITEM,2,4
FITEM,2,-5
ASBW,P51X
LESIZE,6, CRFACE_LESIZE
LESIZE,17, CRFACE_LESIZE
KSCON,7, R_F,1, NEL_THET,1
LESIZE,3,,,3
LESIZE,24,,,3
LESIZE,16,,,3
LESIZE,2,,,3
LESIZE,14,,,3
LESIZE,7,,, (NEL_R-3)
LESIZE,30,,, (NEL_R-3)
LESIZE,27,,, (NEL_R-3)
LESIZE,5,,, (NEL_R-3)
LESIZE,18,,, (NEL_R-3)
LESIZE,23,,,NEL_THET
LESIZE,22,,,NEL_THET
LESIZE,13,,,NEL_THET
LESIZE,25,,,NEL_THET
LESIZE,26,,,NEL_THET
LESIZE,28,,,NEL_THET
LESIZE,29,,,NEL_THET
LESIZE,31,,,NEL_THET
AMESH,8

AMESH,7
AMESH,9
AMESH,10
AMESH,3
AMESH,6
MSHKEY,1
AMESH,12
MSHKEY,1
AMESH,11
MSHKEY,1
AMESH,13
MSHKEY,1
AMESH,14
DL,8,3,UX,0
DL,19,6,UX,0
DK,11,UX,0
DK,11,UY,0
SFL,9,PRES,-P
SFL,20,PRES,-P
SAVE
/SOLU
SOLVE
/POST1
PLNSOL,S,Y
/EDGE,1,1
REPLOT
CLOCAL,11,1,CR_L,0,0

```
NSEL,,LOC,X,- CR_L/10E6, CR_L/10E6

*GET,NN1,NODE,0,NUM,MAX

NSEL,,LOC,Y,180+0.01,180-180/NEL_THET-0.01

  NSEL,R,LOC,X,-0.001,R_F+R_F/100

NSEL,A,LOC,X,-0.001,0.001

ESLN,,1

NSEL,R,LOC,X,R_F/4-R_F/100,R_F/4+R_F/100

NSEL,R,LOC,Y,180+0.01,180-0.01

NSLE,R

*GET,NN2,NODE,0,NUM,MAX

NSEL,,LOC,Y,180+0.01,180-180/NEL_THET-0.01

  NSEL,R,LOC,X,-0.001,R_F+R_F/100

NSEL,A,LOC,X,-0.001,0.001

ESLN,,1

NSEL,R,LOC,X,R_F-R_F/100,R_F+R_F/100

NSEL,R,LOC,Y,180+0.01,180-0.01

NSLE,R

*GET,NN3,NODE,0,NUM,MAX

NSEL,,LOC,Y,-180-0.01,-180+180/NEL_THET+0.01

  NSEL,R,LOC,X,-0.001,R_F+R_F/100

NSEL,A,LOC,X,-0.001,0.001

ESLN,,1

NSEL,R,LOC,X,R_F/4-R_F/100,R_F/4+R_F/100

NSEL,R,LOC,Y,-180-0.01,-180+0.01

NSLE,R

*GET,NN4,NODE,0,NUM,MAX

NSEL,,LOC,Y,-180-0.01,-180+180/NEL_THET+0.01
```

```
NSEL,R,LOC,X,-0.001,R_F+R_F/100
NSEL,A,LOC,X,-0.001,0.001
ESLN,,1
NSEL,R,LOC,X,R_F-R_F/100,R_F+R_F/100
NSEL,R,LOC,Y,-180-0.01,-180+0.01
NSLE,R
*GET,NN5,NODE,0,NUM,MAX
CSYS,0
/POST1
ALLSEL
PATH,K1,5,,30,20
PPATH,1,NN1
PPATH,2,NN2
PPATH,3,NN3
PPATH,4,NN4
PPATH,5,NN5
KCALC,1,1,3
!!! KCALC : Calculation of stress intensity factor (K1)
```