KEK Internal 96-9
August 1996
R/D

EGS4 Shower Display System (EGS4PICT) Windows Version 2.0

H. HIRAYAMA, Y. NAMITO, S. BAN,
R. IKEDA and Y. TOKUDA

NATIONAL LABORATORY FOR
HIGH ENERGY PHYSICS

National Laboratory for High Energy Physics, 1996

KEK Reports are available from:

Technical Information & Library
National Laboratory for High Energy Physics
1-1 Oho, Tsukuba-shi
Ibaraki-ken, 305
JAPAN

Phone: 0298-64-5136
Telex: 3652-534 (Domestic)
(0)3652-534 (International)
Fax: 0298-64-4604
Cable: KEK OHO
E-mail: Library@kekvax.kek.jp (Internet Address)
Internet: http://www.kek.jp

EGS4 Shower Display System (EGS4PICT) Windows Version 2.0

Hideo Hirayama, Yoshihito Namito, Syuichi Ban

National Laboratory for High Energy Physics
1-1, Oho, Tsukuba-shi, Ibaraki, 305 Japan

and

Renzo Ikeda, Yukio Tokuda

Computer Automation Corporation
10F Tukuba Mitui Building
1-6-1 Takezono, Tsukuba-shi, Ibaraki, 305 Japan

Abstract

The EGS4PICT system was upgraded to add the function of semi-interactive drawing of tracks calculated by a PC by selecting the "Calc" or "Redraw" function. Several other improvements were also made.

1 Introduction

The EGS4 Shower Display system (EGS4PICT) is widely used within the EGS4 users' community as an easy tool for the three-dimensional particle trajectories of electrons, positrons and photons on a personal computer (PC).

The current version(1.0) was designed to display particle trajectories calculated with UNIX workstations or PC in the off-line mode. It is desired to see the trajectories of each history (or batch) during an EGS4 calculation. This function was included in version 2.0.

It has became possible to output the display on the file in the bitmap (bmp) format, in order to change the colors of the trajectories etc. from 256 selection if the Windows system uses over 32768 colors.

Several other improvements were also made in this new version.

2 Semi-Interactive Display

Two functions were added to the main display: Calc and Redraw. If "Calc" is selected, the MS-DOS prompt becomes active. You can run the EGS4 calculation, which creates particle trajectories from this MS-DOS prompt.

When the user code written to close the file of the trajectories after the current history finished, you can draw trajectories of the current history by selecting "Redraw". It is required to set the data file of trajectories to that which your user code assigns by using "Data file open" of the "File" menu before the first trial of "Redraw".

If you select the "Calc" function, the MS-DOS prompt again becomes active. You can re-start the EGS4 calculation from this MS-DOS prompt. It is required to use unit 6 as the display on the terminal in order to control the calculations of each history. Therefore, you must not define **OPEN(6,..)** in your user code. It is also required to close the file of the trajectories with the STATUS='KEEP' option after the current history has finished, and to open it with the ACCESS='APPEND' option before going to the next history, as shown below.

```
DO I=1,NCASES [

WRITE(9,:FMT91:) I; :FMT91:FORMAT('0',I5);              "PICT"

  IF (NLINES.LT.NWRITE) [
    OUTPUT EI,ZI,WI,IQI,IRI,ICODE;
    (3G15.7,3I5);
    NLINES=NLINES+1;]

  CALL SHOWER(IQI,EI,XI,YI,ZI,UI,VI,WI,IRI,WTI);

WRITE(9,:FMT92:); :FMT92:FORMAT('9');                   "PICT"

CALL PLOTXYZ(99,0,0,0.,0.,0.,0.D0);                     "PICT"

CLOSE(UNIT=9, STATUS='KEEP');

OUTPUT;(' key in any number');                          "PICT"
INPUT IIK;(I2);                                         "PICT"

OPEN(9,file='mortjob.9ou',ACCESS='APPEND');             "PICT"

"END OF SHOWER-CALL LOOP"]

CALL PLOTXYZ(99,0,0,0.,0.,0.,0.D0);                     "PICT"
```

ucpic4_2.mor is a sample user code of this type. (ucpic4_2.mor is not using PRESTA.)

When you want to display the trajectories of many histories starting from a specified energy as one picture, put `CLOSE(UNIT=9, STATUS='KEEP');` outside the `SHOWER LOOP` as shown below.

```
:NEWENERGY:
OUTPUT;(' Key in photon energy in MeV (0 means end)');
INPUT EI;(F10.4);
IF(EI.EQ.0.0) GO TO :SHOWER-END:;
IF(III.NE.0) [OPEN(9,file=',ortjob.9ou',ACCESS='APPEND');]

III=III+1;

WRITE(9,:FMT91:) III; :FMT91:FORMAT('0',I5);              "PICT"

DO J=1,NCASES [

  CALL SHOWER(IQI,EI,XI,YI,ZI,UI,VI,WI,IRI,WTI);
]

WRITE(9,:FMT92:); :FMT92:FORMAT('9');                    "PICT"

CALL PLOTXYZ(99,0,0,0.,0.,0.,0.D0);                     "PICT"

CLOSE(UNIT=9, STATUS='KEEP');

GO TO :NEWENERGY:;

:SHOWER-END:
```

uccham_2.mor is a sample user code of this type. (uccham_2.mor is using PRESTA.)

If you want to see the trajectories of the previous history, you can do so by using the "History" command.

If you start the display of trajectories with "Data file open" of the "File" menu, you can use the system exactly in the same way as in version 1.0.

3 Other Change from version 1.0

3.1 "File" menu

"Bitmap file save" was added to the "File" menu. If "Bitmap file save" is clicked, the displayed trajectories are saved in the specified file in the bitmap format (.bmp file).

3.2 Environment

3.2.1 Color select

The color-selection pallet is expanded to 256 colors if the Windows uses over 32,768 colors.[1] Otherwise, the color selection Window is the same as that of version 1.0.

[1] Due to the restriction in language used (Boland C++, 32,768 Windows colors are necessary to use 256 colors in EGS4PICT.

3.2.2 Geometry color and Character color

It has become possible to change the color of the geometry or character. If "Color Button" is clicked, the color-select window appears and the geometry or character color can be selected from a pallet.

3.3 Picture size

The size of the picture can be changed by selecting "Picture size".

4 How to obtain EGS4PICT System Version 2.0

You can obtain the EGS4PICT System Version 2.0 from ftp.kek.jp via an anonymous ftp. The system is located at the directory

`~ftp/kek/kek_egs4/pictwin`.

Obtain 2 files, README2 and pictwin2.exe, in the binary mode.

After obtaining pictwin2.exe and execute pictwin2 you can obtain shower.exe and shower.hlp etc. By executing shower.exe, the EGS4PICT System Version 2.0 runs. If your PC is a Compaq, delete shower.exe and rename compaq.exe to shower.exe.

You can see semi-interactive shower pictures by running the sample user code, ucpic4_2.mor, with its material data, sampl4.dat. These 2 files are also included in pictwin2.exe.

Appendix: List of ucpic4_2.mor

```
!INDENT C6;
!INDENT M3;
!INDENT F2;
"*************************************************************************"
"***************************     STANFORD LINEAR ACCELERATOR CENTER"
"***   U C P I C 4 _ 2 *****                                              "
"***************************     EGS4 USER CODE -- 23 NOV 1985/1830"
"*************************************************************************"
"                                                                         "
"************"
"*** MAIN ***"
"************"

"STEP 1.  USER-OVER-RIDE-OF-EGS-MACROS"

REPLACE{$MXREG} WITH {20} "OVER-RIDE MAXIMUM NO. OF REGIONS"
;COMIN/BOUNDS,DEBUG,MEDIA,MISC,PLADTA,USEFUL/;   "COMMONS NEEDED"
COMMON/PASSIT/ZTHICK; "SLAB THICKNESS....NEEDED IN HOWFAR"
COMMON/LINES/NLINES,NWRITE; "TO KEEP TRACK OF LINES-PRINTED"
COMMON/TOTALS/ESUM($MXREG);  "FOR ENERGY CONSERVATION CHECK"
COMMON/NFAC/FNORM,XMIN,XMAX,YMIN,YMAX,ZMIN,ZMAX;                    "PICT"
"$ENERGY PRECISION EI,ESUM,EKIN,TOTKE,ETOT; DOUBLE PRECISION"
$ENERGY PRECISION ESUM,EKIN,TOTKE,ETOT; "DOUBLE PRECISION KLUDGE"
" Y.NAMITO & H.HIRAYAMA"
"CREATE A TEMPORARY ARRAY AND DEFINE THE MEDIA, NEXT"
$TYPE TEMP(24,2)/$S'FE-RAYLEIGH',13*' ',$S'AIR AT NTP',14*' '/;
COMIN/RANDOM/;  "LOCATED HERE TO AVOID FORTRAN 77 DIAGNOSTIC"

"STEP 2.  PRE-HATCH-CALL-INITIALIZATION"
OPEN(8,FILE='mortjob.dum');
OPEN(9,file='mortjob.9ou',status='unknown');     "PICT"
OPEN(12,FILE='mortjob.xse',status='old');

"THE NUMBER OF REGIONS---A LOCAL VARIABLE ONLY"
NREG=3;

NMED=2;   "TWO MEDIA WILL BE USED"
DO J=1,NMED [DO I=1,24 [MEDIA(I,J)=TEMP(I,J);]]

MED(1)=0;  "REGION 1 IS VACUUM"
MED(2)=1;  "REGION 2 IS IRON"
MED(3)=2;  "REGION 3 IS AIR AT NTP"

"SET ENERGY CUTOFFS FOR EACH REGION NEXT"
DO I=1,NREG [ECUT(I)=1.511;]

"STEP 3.  HATCH-CALL"

CALL HATCH;

"STEP 4.  INITIALIZATION-FOR-HOWFAR"

ZTHICK=5.0;  "SLAB THICKNESS IN CENTIMETERS"

"STEP 5.  INITIALIZATION-FOR-AUSGAB"

DO I=1,$MXREG [ESUM(I)=0.D0;] "ZERO THE ENERGY BALANCE ARRAY"

NLINES=0;  "INITIALIZE THE NLINES-COUNTER"
NWRITE=15; "THE NUMBER OF LINES TO PRINT OUT"

"STEP 6.  DETERMINATION-OF-INCIDENT-PARTICLE-PROPERTIES"

IQI=-1;  "INCIDENT PARTICLE IS AN ELECTRON"
```

```
EI=1000.E0; "INCIDENT ENERGY (TOTAL) IN MEV  "
EKIN=EI-PRM;  "K.E. OF ELECTRON---PRM IS THE REST MASS"
XI=0.0; YI=0.0; ZI=0.0;  "COORDINATES OF INCIDENT PARTICLE"
UI=0.0; VI=0.0; WI=1.0;  "DIRECTION COSINES---ALONG Z=AXIS"
IRI=2;  "INCIDENT PARTICLE STARTS OUT IN REGION 2---IRON"
WTI=1.0;  "WEIGHT FACTOR---NOT USED IN CALCULATION, BUT"
"          IS A PARAMETER IN SUBROUTINE SHOWER; HENCE DEFINE"
"          AS UNITY"
IXX=987654321;  "RANDOM NUMBER GENERATOR SEED"
NCASES=5;  "NUMBER OF HISTORIES (CASES) TO RUN"
ICODE=-1;  "AN OUTPUTING PARAMETER, INVENTED TO MARK THE"
"           INCIDENT PARTICLES"

"STEP 7.  SHOWER-CALL"

OUTPUT;  (1H1/,' SHOWER RESULTS:',///,7X,'E',14X,
  'Z',14X,'W',10X,'IQ',3X,'IR',2X,'IARG',/);

" Parameter to define graphic size. It is better that the   **PICT**"
" width of each axis is nearly same.                        **PICT**"
XMIN=-5; XMAX=5.0; YMIN=-5.0; YMAX=5.0; ZMIN=0.0; ZMAX=ZTHICK; "PICT"

NPLAN=6;
/PNORM(3,1),PNORM(3,2)/=1.0;
PCOORD(3,1)=0.0; PCOORD(3,2)=ZMAX;
/PNORM(2,3),PNORM(2,4)/=1.0;
PCOORD(2,3)=-5.0; PCOORD(2,4)=5.0;
/PNORM(1,5),PNORM(1,6)/=1.0;
PCOORD(1,5)=-5.0; PCOORD(1,6)=5.0;

CALL GEOMOUT(0,NPLAN);                                      "PICT"

FNORM=AMAX1(XMAX-XMIN,YMAX-YMIN,ZMAX-ZMIN);                 "PICT"
WRITE(9,:FMT90:) XMIN,XMAX,YMIN,YMAX,ZMIN,ZMAX,FNORM;       "PICT"
:FMT90:FORMAT(7F10.2);                                      "PICT"

DO I=1,NCASES [

WRITE(9,:FMT91:) I; :FMT91:FORMAT('0',I5);                  "PICT"

  IF (NLINES.LT.NWRITE) [
    OUTPUT EI,ZI,WI,IQI,IRI,ICODE;
    (3G15.7,3I5);
    NLINES=NLINES+1;]

  CALL SHOWER(IQI,EI,XI,YI,ZI,UI,VI,WI,IRI,WTI);

WRITE(9,:FMT92:); :FMT92:FORMAT('9');                       "PICT"

CALL PLOTXYZ(99,0,0,0.,0.,0.,0.D0);                         "PICT"

CLOSE(UNIT=9, STATUS='KEEP');

OUTPUT;(' key in any number');
INPUT IIK;(I2);

OPEN(9,file='mortjob.pic',ACCESS='APPEND');

"END OF SHOWER-CALL LOOP"]

CALL PLOTXYZ(99,0,0,0.,0.,0.,0.D0);                         "PICT"

"STEP 8.  OUTPUT-OF-RESULTS"

TOTKE=NCASES*EKIN;  "TOTAL K.E. INVOLVED IN RUN"

OUTPUT EI,ZTHICK,NCASES,IXX;
(//,' INCIDENT TOTAL ENERGY OF ELECTRON=',F12.1,' MEV',/,
```

```
  ' IRON SLAB THICKNESS=',F6.3,' CM',/,
  ' NUMBER OF CASES IN RUN=',I3,/,' LAST RANDOM NUMBER=',
  I12,//,' ENERGY DEPOSITION SUMMARY:',//);

"CALCULATE AND PRINT OUT THE FRACTION OF ENERGY"
"DEPOSITED IN EACH REGION"

ETOT=0.D0;
DO I=1,NREG [
  ETOT=ETOT+ESUM(I);
  ESUM(I)=ESUM(I)/TOTKE;  "FRACTION IN EACH REGION"

  OUTPUT I, ESUM(I);  (' FRACTION IN REGION',I3,'=',F10.7);
]

ETOT=ETOT/TOTKE;  "THE TOTAL FRACTION OF ENERGY IN RUN"

OUTPUT ETOT;  (//,' TOTAL ENERGY FRACTION IN RUN=',G15.7,/,
  '   WHICH SHOULD BE CLOSE TO UNITY');

STOP;
END;  "LAST STATEMENT OF MAIN"



SUBROUTINE AUSGAB(IARG);
COMIN/EPCONT,STACK/; "COMMONS NEEDED IN AUSGAB"
COMMON/LINES/NLINES,NWRITE; "TO KEEP TRACK OF LINES-PRINTED"
COMMON/TOTALS/ESUM($MXREG);  "FOR ENERGY CONSERVATION CHECK"
$ENERGY PRECISION ESUM;  "DOUBLE PRECISION"

"KEEP A RUNNING SUM OF THE ENERGY DEPOSITED IN EACH REGION"
ESUM(IR(NP))=ESUM(IR(NP)) + EDEP;

"PRINT OUT THE FIRST NLINES OF STACK INFORMATION, ETC."
"BUT, ONLY FOR PHOTONS THAT ARE DISCARDED IN REGION 3"

CALL PLOTXYZ(IARG,NP,IQ(NP),X(NP),Y(NP),Z(NP),E(NP));   "PICT"

IF (NLINES.LT.NWRITE) [
    OUTPUT E(NP),Z(NP),W(NP),
    IQ(NP),IR(NP),IARG; (3G15.7,3I5);

    NLINES=NLINES+1; ]

RETURN;
END;  "LAST STATEMENT OF SUBROUTINE AUSGAB"


SUBROUTINE HOWFAR;
COMIN/DEBUG,EPCONT,STACK/;  "COMMON NEEDED IN HOWFAR"
COMMON/PASSIT/ZTHICK; "SLAB THICKNESS DEFINED IN MAIN"

IF (IR(NP).NE.2) [IDISC=1; RETURN;]

"MIGHT AS WELL SET DNEAR NEXT"
DNEAR(NP)=AMIN1(Z(NP),ZTHICK-Z(NP));

IF (W(NP).EQ.0.0) [RETURN; "PARTICLE GOING PARALLEL TO PLANES"]

"CHECK FORWARD PLANE FIRST SINCE SHOWER HEADING THAT WAY"
"MOST OF THE TIME"
IF (W(NP).GT.0.0) [DELTAZ=(ZTHICK-Z(NP))/W(NP); IRNXT=3;]
"OTHERWISE, PARTICLE MUST BE HEADING IN BACKWARDS DIRECTION"
ELSE [DELTAZ=-Z(NP)/W(NP); IRNXT=1;]
"NOW CHECK WITH USTEP AND RESET THINGS IF NECESSARY"
IF (DELTAZ.LE.USTEP) [USTEP=DELTAZ; IRNEW=IRNXT;]
```

```
RETURN;

"LAST STATEMENT OF EGS4 USER CODE UCSAMPL4" END;
%E
"*****************************************************************"
"                    KEK,National Laboratory for High Energy Physics"
SUBROUTINE PLOTXYZ(IARG,NP,IQ,X,Y,Z,ENP);
"                                  EGS4 SUBPROGRAM - 03 MAR 1994/1515"
"*****************************************************************"
"Output X,Y,Z,IQ,E for 3 dimensional graphic display on PC.        "
"This subroutine based on PLOTXZ developped at SLAC for 2          "
"dimensional display with UG.                                      "
"                                  H. Hirayama                     "
"*****************************************************************"
COMIN/DEBUG/;
COMMON/NFAC/FNORM,XMIN,XMAX,YMIN,YMAX,ZMIN,ZMAX;
DIMENSION IXPT(100,40),IYPT(100,40),IZPT(100,40),IEPT(100,40),
          NPT(40),IQTOLD(40);
$ENERGYPRECISION ENP;
DATA NPT/40*0/;

IF(IARG.EQ.99) [

DO I=1,40 [
IF(NPT(I).LE.1) NEXT;
IF(IQTOLD(I).EQ.0) [IIQ=1;]
ELSEIF(IQTOLD(I).EQ.-1) [IIQ=2;]
ELSE [IIQ=3;]
DO INP=1,NPT(I) [
WRITE(9,:FMT90:) IIQ,IXPT(INP,I),IYPT(INP,I),IZPT(INP,I),IEPT(INP,I);
:FMT90:FORMAT(I1,4I5);
IF(INP.EQ.NPT(I)) [
WRITE(9,:FMT91:);
:FMT91:FORMAT('-1');
]
]
NPT(I)=0;
]

"END OF IARG EQ 99 LOOP"]

ELSE ["IARG NE 99"
IF(X/FNORM.GT.4.999.OR.X/FNORM.LT.-4.999) [RETURN;]
IF(Y/FNORM.GT.4.999.OR.Y/FNORM.LT.-4.999) [RETURN;]
IF(Z/FNORM.GT.4.999.OR.Z/FNORM.LT.-4.999) [RETURN;]
JARG=IARG;
NPT(NP)=NPT(NP) + 1;
IF(NPT(NP).EQ.1) IQTOLD(NP)=IQ;
IXPT(NPT(NP),NP)=X/FNORM*10000+50000;
IYPT(NPT(NP),NP)=Y/FNORM*10000+50000;
IZPT(NPT(NP),NP)=Z/FNORM*10000+50000;
IF(IQ.EQ.0) [EEE=ENP*1000.;]
ELSE [EEE=(ENP-0.511)*1000.]
IF(EEE.LT.10000.0) [
IEPT(NPT(NP),NP)=INT(EEE)*10;]
ELSE [
IFF=ALOG10(EEE)-3;
IEF=EEE/10**IFF;
IEPT(NPT(NP),NP)=IEF*10+IFF;]

IF(IQ.NE.IQTOLD(NP)) JARG=-1;

IF(NPT(NP).GE.100.OR.JARG.NE.0) [
IF(IQTOLD(NP).EQ.0) [IIQ=1;]
ELSEIF(IQTOLD(NP).EQ.-1) [IIQ=2;]
ELSE [IIQ=3;]
IF(NPT(NP).GT.1) [
DO INP=1,NPT(NP) [
```

```
WRITE(9,:FMT90:) IIQ,IXPT(INP,NP),IYPT(INP,NP),IZPT(INP,NP),IEPT(INP,NP);
IF(INP.EQ.NPT(NP)) [WRITE(9,:FMT91:);]
]]

IF(JARG.GT.0.OR.IARG.GT.0) [NPT(NP)=0;]

ELSEIF(JARG.EQ.-1) [
IXPT(1,NP)=IXPT(NPT(NP),NP);
IYPT(1,NP)=IYPT(NPT(NP),NP);
IZPT(1,NP)=IZPT(NPT(NP),NP);
IEPT(1,NP)=IEPT(NPT(NP),NP);
NPT(NP)=1;
IQTOLD(NP)=IQ;
]

ELSE [
NPT(NP)=1;
IXPT(1,NP)=IXPT(100,NP);
IYPT(1,NP)=IYPT(100,NP);
IZPT(1,NP)=IZPT(100,NP);
IEPT(1,NP)=IEPT(100,NP);
]

]


ELSE [IQTOLD(NP)=IQ;]

"END OF IARG NE 99 LOOP"]

RETURN;
END;  "END OF SUBROUTINE PLOTXZ"

"*********************************************************************"
"                    KEK,National Laboratory for High Energy Physics"
SUBROUTINE GEOMOUT(NCYLG,NPLANG);
"                                  EGS4 SUBPROGRAM - 05 SEP 1994/1515"
"*********************************************************************"
"Output geometry data for cylinder-slab or slab geometry.           "
"                                   H. Hirayama                     "
"*********************************************************************"
COMIN/DEBUG,PLADTA,CYLDTA/;
COMMON/NFAC/FNORM,XMIN,XMAX,YMIN,YMAX,ZMIN,ZMAX;
DIMENSION CYL($MXCYLS),ZBIN($MXPLNS),YBIN($MXPLNS),XBIN($MXPLNS);
IF(NCYLG.NE.0) ["Cylinder slab geometry"
WRITE(9,:FMT90:);
:FMT90:FORMAT('GSTA');
WRITE(9,:FMT91:);
:FMT91:FORMAT('CYLS');
WRITE(9,:FMT92:) NCYLG,NPLANG;
:FMT92:FORMAT(3I6);
DO I=1,NCYLG [
CYL(I)=SQRT(CYRAD2(I));
]
WRITE(9,:FMT93:) (CYL(I),I=1,NCYLG);
:FMT93:FORMAT(8E10.3);
NZP=0;
DO I=1,NPLANG [
IF(PNORM(3,I).EQ.1.AND.(PCOORD(3,I).GE.ZMIN.AND.PCOORD(3,I).LE.ZMAX)) [
NZP=NZP+1;
ZBIN(NZP)=PCOORD(3,I);]
]
IF(NZP.EQ.0) [
NZP=2;
ZBIN(1)=ZMIN; ZBIN(2)=ZMAX;
]
WRITE(9,:FMT93:) (ZBIN(I),I=1,NZP);
WRITE(9,:FMT94:);
```

```
:FMT94:FORMAT('GEND');
]  "End of Cylinder slab geometry"

ELSEIF(NPLANG.NE.0) ["Plane geometry"
WRITE(9,:FMT90:);
WRITE(9,:FMT95:);
:FMT95:FORMAT('SLAB');

/NZP,NYP,NXP/=0;
DO I=1,NPLANG [
IF(PNORM(1,I).EQ.1) [
IF(PCOORD(1,I).GE.XMIN.AND.PCOORD(1,I).LE.XMAX) [
NXP=NXP+1;
XBIN(NXP)=PCOORD(1,I);]]
ELSEIF(PNORM(2,I).EQ.1) [
IF(PCOORD(2,I).GE.YMIN.AND.PCOORD(2,I).LE.YMAX) [
NYP=NYP+1;
YBIN(NYP)=PCOORD(2,I);]]
ELSE [
IF(PCOORD(3,I).GE.ZMIN.AND.PCOORD(3,I).LE.ZMAX) [
NZP=NZP+1;
ZBIN(NZP)=PCOORD(3,I);]]
]
ZWID=ABS(ZMAX-ZMIN);
IF(NXP.EQ.0) [NXP=2;
XBIN(1)=-ZWID/2.0;
XBIN(2)=ZWID/2.0;]
IF(NYP.EQ.0) [NYP=2;
YBIN(1)=-ZWID/2.0;
YBIN(2)=ZWID/2.0;]
OUTPUT (PNORM(1,I),PNORM(2,I),PNORM(3,I),I=1,NPLANG);
(' PNORM(1)    PNORM(2)      PNORM(3)'/(3G15.5));
WRITE(9,:FMT92:) NXP,NYP,NZP;
WRITE(9,:FMT93:) (XBIN(I),I=1,NXP);
WRITE(9,:FMT93:) (YBIN(I),I=1,NYP);
WRITE(9,:FMT93:) (ZBIN(I),I=1,NZP);
WRITE(9,:FMT94:);
]

ELSE [" Do not produce geometry data"
WRITE(9,:FMT90:);
WRITE(9,:FMT94:);
STOP;]

RETURN;
END;  "END OF SUBROUTINE GEOMOUT"
"************************************************************"
"******************** End of ucpict4.mor ********************"
"************************************************************"
```