

เอกสารอ้างอิง

- เล็ก จุฑะสุด, "การสำรวจและออกแบบแนวสายส่งสื่อกำลังสูงโดยเทคนิคการสำรวจด้วยภาพถ่าย" วิทยานิพนธ์ปริญญาโทมหาบัณฑิต ภาควิชาวิศวกรรมสำรวจ บัณฑิตวิทยาลัย จุฬาลงกรณ์มหาวิทยาลัย 2527.
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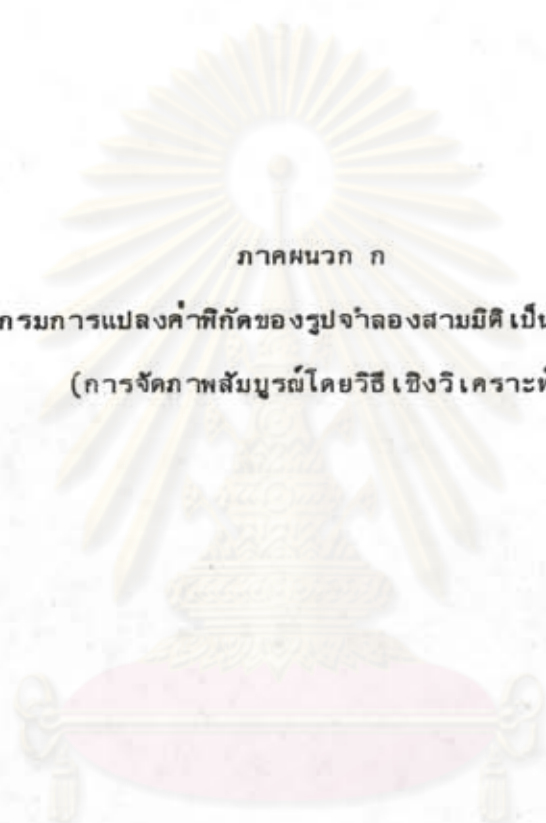
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ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

The emblem of the National Council of Higher Education is centered on the page. It features a golden sunburst at the top, a golden tiered umbrella (parasol) in the middle, and a pink oval base with golden tassels at the bottom.

ภาคผนวก ก

โปรแกรมการแปลงค่าทศของรูปจำลองสามมิติ เป็นค่าทศของภูมิประเทศ
(การจัดภาพสัมบูรณ์โดยวิธีเชิงวิเคราะห์)

ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

ภาคผนวก ก

```

*****
** PPA08.FTT                          **
** MICH-7 3/8/85                       **
** Language : FORTRAN77                **
** Date 14 date : 05/02/85             **
*****
*
*   MAIN PROGRAM
*
*   PROGRAM MAIN
*
*   IMPLICIT INTEGER(1-N)
*   DOUBLEPRECISION X(7),Y(7),Z(7),XG(7),YG(7),ZG(7)
*   X(7)=0.0,Y(7)=0.0,Z(7)=0.0,XG(7)=0.0,YG(7)=0.0,ZG(7)=0.0
*   DO 10 I=1,7
*   X(I)=1.0,Y(I)=0.0,Z(I)=0.0
*   XG(I)=0.0,YG(I)=0.0,ZG(I)=0.0
*   10 CONTINUE
*
*   REAL
*   M(7),M0(7),K(7),S(7),X0(7),Y0(7),Z0(7)
*   M(7)=0.0,M0(7)=0.0,K(7)=0.0,S(7)=0.0
*   X0(7)=0.0,Y0(7)=0.0,Z0(7)=0.0
*
*   DATA X(1:7),Y(1:7),Z(1:7),XG(1:7),YG(1:7),ZG(1:7)
*   / 1.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0 /
*   / 0.0, 1.0, 0.0, 0.0, 0.0, 0.0, 0.0 /
*   / 0.0, 0.0, 1.0, 0.0, 0.0, 0.0, 0.0 /
*   / 0.0, 0.0, 0.0, 1.0, 0.0, 0.0, 0.0 /
*   / 0.0, 0.0, 0.0, 0.0, 1.0, 0.0, 0.0 /
*   / 0.0, 0.0, 0.0, 0.0, 0.0, 1.0, 0.0 /
*   / 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 1.0 /
*   / 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0 /
*   / 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0 /
*   / 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0 /
*   / 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0 /
*   / 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0 /
*   / 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0 /
*   / 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0 /
*   / 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0 /
*   / 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0 /
*   / 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0 /
*   / 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0 /
*   / 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0 /
*   / 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0 /
*
*   M
*
*   R = A .DXXX.DXXX
*
*   M0,M0,K0,S0,X0,Y0,Z0,D0,D0
*
*   DM,DK,DX,DY,DZ,AX
*
*   ITER
*
*   START
*
*   *****
*   ** READ DATA FROM FILE**
*   *****
*
*   OPEN(2,FILE='PRAK08.DAT')
*   READ(2,104) N
*
*
*   DO 14 I = 1,N
*   14 READ(2,114) XG(I),YG(I),ZG(I),XG(I),YG(I),ZG(I)
*
*   104 FORMAT(I3)
*   114 FORMAT(3(F11.3))
*
*   close (unit = 2)
*   close (unit = 2)
*   open (3,file='RESULT.T')
*
*
*   WRITE(3,103) N
*   103 FORMAT(1X,'N'='I3,/' DATA'/'
*   DO 400 I = 1,N
*   400 WRITE(3,103) I,XG(I),YG(I),ZG(I),XG(I),YG(I),ZG(I)
*   103 FORMAT(1X,I3,5X,'X'='I3(2(F20.5,3X)/8X,17='I3(2(F20.5,3X)
*   /8X,2='I3(2(F20.5,3X))
*
*
*   *****
*
*   Initialvalue

```

ภาคผนวก ก (ต่อ)

```

*
*
WRITE(3,255)
WRITE(6,255)
255  FORMAT(1X,/' Initial Iteration' /)
*
W0   = 00.0
M0   = 00.0
K0   = 00.0
*
DXX0 =      (XX0(1) - XX0(3)) + (XX0(1) - XX0(3))
DYY0 = DXX0 + (YY0(1) - YY0(3)) * (YY0(1) - YY0(3))
DZZ0 = DXX0 + (ZZ0(1) - ZZ0(3)) * (ZZ0(1) - ZZ0(3))
*
DXXG =      (XXG(1) - XXG(3)) * (XXG(1) - XXG(3))
DYYG = DXXG + (YYG(1) - YYG(3)) * (YYG(1) - YYG(3))
DZZG = DXXG + (ZZG(1) - ZZG(3)) * (ZZG(1) - ZZG(3))
*
S0   = DSQRT(DXXG/DXX0)
X0   = XXG(1) - S0 * (XX0(1) * COS(M0) )
Y0   = YYG(1) - S0 * (ZZ0(1) * COS(M0) )
Z0   = ZZG(1) - S0 * YY0(1)
*
1111 WRITE(3,556) S0,W0,M0,K0,X0,Y0,Z0
WRITE(6,556) S0,W0,M0,K0,X0,Y0,Z0
*
WRITE(6,568)
568  FORMAT(1X,'CALCULATE R',/)
CALL CALR(R,M0,K0,W0)
*
WRITE(6,203)
203  FORMAT(1X,'CALCULATE F',/)
CALL CALF(XX0,YY0,ZZ0,F0,R,XXG,YYG,ZZG,S0,N,
&      X0, Y0, Z0)
*
WRITE(6,569)
569  FORMAT(1X,'CALCULATE A',/)
CALL CALA(XX0,YY0,ZZ0,A,R,S0,M0,K0,W0,N)
*
WRITE(6,579)
579  FORMAT(1X,'CALCULATE RESULT',/)
CALL RESULT(F0,A,DIF,N,IER)
*
IF (IER) 123,123,10000
*
PRINT RESULT
*
123  DS = DIF(1,1)
      DW = DIF(2,1)
      DM = DIF(3,1)
      DK = DIF(4,1)
      DX = DIF(5,1)
      DY = DIF(7,1)
      DZ = DIF(6,1)
*
WRITE(3,555) DS,DW,DM,DK,DX,DY,DZ
WRITE(6,555) DS,DW,DM,DK,DX,DY,DZ
555  FORMAT(1X,/' Difference' /)
&
&
&
DS = ',F15.5/
DW = ',F15.5/
DM = ',F15.5/

```

ภาคผนวก ก (ต่อ)

```

      DK = ',F15.5/
      DX = ',F15.5/
      DY = ',F15.5/
      DZ = ',F15.5//)
*
* Terminate ?
*
      IF (ABS(DS) .LE. 0.01
      .AND. ABS(DW) .LE. 0.00001
      .AND. ABS(DM) .LE. 0.00001
      .AND. ABS(DK) .LE. 0.00001
      .AND. ABS(DX) .LE. 0.01
      .AND. ABS(DY) .LE. 0.01
      .AND. ABS(DZ) .LE. 0.01) GOTO 9996
*
* Assign new value
*
      S0 = S0 + DS
      W0 = W0 + DW
      M0 = M0 + DM
      K0 = K0 + DK
      X0 = X0 + DX
      Y0 = Y0 + DY
      Z0 = Z0 + DZ
      ITER = ITER + 1
      WRITE(3,987) ITER
      WRITE(6,987) ITER
987  FORMAT(1X,/// 'Iteration no.',I3/)
      IF (ITER - 10) 1111,1111,1112
1112 WRITE(3,1098)
      WRITE(6,1098)
1098 FORMAT(1X,/// 'Source terminated on iteration 10'//)
*
9996 WRITE(3,556) S0,W0,M0,K0,X0,Y0,Z0
556  FORMAT(1X,/// 'Parameter '///
      S0 = ',F15.5/
      W0 = ',F15.5/
      M0 = ',F15.5/
      K0 = ',F15.5/
      X0 = ',F15.5/
      Y0 = ',F15.5/
      Z0 = ',F15.5//)
*
      WRITE(3,765)
      WRITE(6,765)
765  FORMAT(1X,/// 'Ground Coordinates:',3X,'Computed ',11X,
      'Control ',12X,'Residuals '///)
*
      NNN = N*3
      I = 7
      J = 1
      CALL PMPROD(A,DIF,AX,NNN,I,J)
      CALL PMADD (AX,F0,U,NNN,J )
*
      DO 35 I = 1,N
      XG(I) = S0*( R(1,1)*XX0(I) + R(1,2)*Y0(I)
      +R(1,3)*Z0(I) ) + X0
      YG(I) = S0*( R(3,1)*XX0(I) + R(3,2)*Y0(I)
      +R(3,3)*Z0(I) ) + Y0
35  ZG(I) = S0*( R(2,1)*XX0(I) + R(2,2)*Y0(I)

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ภาคผนวก ก (ต่อ)

```

      +R(2,3)+Z0(1)
      + Z0

      DO 67 L = 1,N
        I1 = L+3 - 2
        JJ = L+3 - 1
        KK = L*3
        WRITE(3,303) L,XG(L),XXG(L),U(I1,J),YG(L),YYG(L),U(KK,J)
          ,ZG(L),ZZG(L),U(JJ,J)
        WRITE(6,303) L,XG(L),XXG(L),U(I1,J),YG(L),YYG(L),U(KK,J)
          ,ZG(L),ZZG(L),U(JJ,J)

      303  FORMAT(1X,12,5X,'X = ',3(F18.5,3X)/9X,'Y = ',3(F18.5,3X)
          /8X,'Z = ',3(F18.5,3X) )

      WRITE(3,700)
      WRITE(6,700)
      700  FORMAT(5X,/' Model Coordinates ',20X,
          /' Ground Coordinates '/')

      OPEN (7,FILE='INPUT.1')

      READ(7,800)NDAT
      800  FORMAT(15)

      DO 701 I = 1,NDAT
        PRINT *,I
        READ(7,901)M,XM,YM,ZM
        IF(M .EQ. 99999) THEN
          GOTO 10000
        ENDIF
        901  FORMAT(15,3(F11.3) )

        X = S0*( R(1,1)*XM + R(1,2)*YM
          +R(1,3)*ZM ) + X0
        Y = S0*( R(3,1)*XM + R(3,2)*YM
          +R(3,3)*ZM ) + Y0
        Z = S0*( R(2,1)*XM + R(2,2)*YM
          +R(2,3)*ZM ) + Z0
        WRITE(3,805)M,XM,X,YM,Y,ZM,Z
        WRITE(6,805)M,XM,X,YM,Y,ZM,Z

      805  FORMAT(1X,15,5X,'X = ',2(F18.5,3X)/11X
          ,',Y = ',2(F18.5,3X)/11X
          ,',Z = ',2(F18.5,3X) )

      10000  END

      *
      * *****
      * SUBROUTINE A-matrix *
      * *****
      * CALA
      *
      SUBROUTINE CALA(XX0,YY0,ZZ0,A,R,OS0,O00,OK0,OW0,N)

```


ภาคผนวก ก (ต่อ)

```

DIMENSION XX0(N),YY0(N),ZZ0(N),R(3,3),A(21,7)
IMPLICIT INTEGER(I-N)
DOUBLEPRECISION XX0,YY0,ZZ0,R,A,OS0
REAL OS0,OW0,OK0
*
  I = 0
*
DO 100 J = 1,N
*
  I = I + 1
*
  A(I,1) = R(1,1)*XX0(J) + R(1,2)*YY0(J)
&          + R(1,3)*ZZ0(J)
*
  A(I,2) = 0.0
  A(I,3) = OS0*( XX0(J)*(-SIN(OW0)*COS(OK0) )
&          +ZZ0(J)*(-COS(OW0)*COS(OK0) )
*
  A(I,4) = OS0*( XX0(J)*(-COS(OW0)*SIN(OK0) )
&          +YY0(J)*COS(OK0) )
&          -ZZ0(J)*SIN(OW0)*SIN(OK0) )
*
  A(I,5) = 1.
  A(I,6) = 2.
  A(I,7) = 3.
*
  I = I + 1
*
  A(I,1) = R(2,1)*XX0(J) + R(2,2)*YY0(J)
&          + R(2,3)*ZZ0(J)
*
  A(I,2) = OS0*( XX0(J)*( SIN(OW0)*COS(OW0)*SIN(OK0)
&          +COS(OW0)*SIN(OW0) )
&          +YY0(J)*(-SIN(OW0)*COS(OK0) )
&          +ZZ0(J)*(-SIN(OW0)*SIN(OW0)*SIN(OK0)
&          +COS(OW0)*COS(OW0) ) )
*
  A(I,3) = OS0*( XX0(J)*( COS(OW0)*SIN(OW0)*SIN(OK0)
&          +SIN(OW0)*COS(OW0) )
&          +ZZ0(J)*( COS(OW0)*COS(OW0)*SIN(OK0)
&          -SIN(OW0)*SIN(OW0) ) )
*
  A(I,4) = OS0*( XX0(J)*(-COS(OW0)*COS(OW0)*COS(OK0)
&          +YY0(J)*(-COS(OW0)*SIN(OW0)*SIN(OK0) )
&          +ZZ0(J)*( COS(OW0)*SIN(OW0)*COS(OK0) ) )
*
  A(I,5) = 0.
  A(I,6) = 1.
  A(I,7) = 0.
*
  I = I + 1
*
  A(I,1) = R(3,1)*XX0(J) + R(3,2)*YY0(J)
&          + R(3,3)*ZZ0(J)
*
  A(I,2) = OS0*( XX0(J)*( COS(OW0)*COS(OW0)*SIN(OK0)
&          -SIN(OW0)*SIN(OW0) )
&          +YY0(J)*(-COS(OW0)*COS(OK0) )
&          +ZZ0(J)*(-COS(OW0)*SIN(OW0)*SIN(OK0)
&          -SIN(OW0)*COS(OW0) ) )
*
  A(I,3) = OS0*( XX0(J)*(-SIN(OW0)*SIN(OW0)*SIN(OK0)
&          +COS(OW0)*COS(OW0) )
&          +ZZ0(J)*(-SIN(OW0)*COS(OW0)*SIN(OK0)
&          -COS(OW0)*SIN(OW0) ) )
*
  A(I,4) = OS0*( XX0(J)*( SIN(OW0)*COS(OW0)*COS(OK0)
&          +YY0(J)*SIN(OW0)*SIN(OK0) )
&          +ZZ0(J)*(-SIN(OW0)*SIN(OW0)*COS(OK0) )

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ภาคผนวก ก (ต่อ)

```

      A(1,5) = 0.
      A(1,6) = 0.
100   A(1,7) = 1.
      RETURN
      END
*
*
* CALF
*
SUBROUTINE CALF(XX0,YY0,ZZ0,F0,R,XXG,YYG,ZZG,OS0,N,
&           X0,Y0,Z0)
DIMENSION  XX0(N),YY0(N),ZZ0(N),F0(21,1),R(3,3),
&           XXG(N),YYG(N),ZZG(N),OS0
IMPLICIT   INTEGER(I-N)
DOUBLEPRECISION XX0,YY0,ZZ0,F0,R,
&           XXG,YYG,ZZ0,OS0
REAL       X0,Y0,Z0
*
      J = 0
*
CC 100 I = 1,N
*
      J = J + 1
*
      F0(J,1) = OS0*( R(1,1)*XX0(I)
&                  +R(1,2)*YY0(I)
&                  +R(1,3)*ZZ0(I) ) + X0      - XXG(I)
*
      J = J + 1
*
      F0(J,1) = OS0*( R(2,1)*XX0(I)
&                  +R(2,2)*YY0(I)
&                  +R(2,3)*ZZ0(I) ) + Z0      - ZZG(I)
*
      J = J + 1
*
100   F0(J,1) = OS0*( R(3,1)*XX0(I)
&                  +R(3,2)*YY0(I)
&                  +R(3,3)*ZZ0(I) ) + Y0      - YYG(I)
*
      RETURN
      END
*
* CALR
*
SUBROUTINE CALR(R,OO0,OK0,OW0)
DOUBLEPRECISION R(3,3)
REAL           OO0,OK0,OW0
*
      R(1,1) =      COS(OO0)*COS(OK0)
      R(1,2) =      SIN(OO0)*SIN(OK0)
      R(1,3) =      -SIN(OO0)*COS(OK0)
      R(2,1) = -COS(OW0)*COS(OO0)*SIN(OK0) + SIN(OW0)*SIN(OO0)
      R(2,2) =  COS(OW0)*SIN(OO0)*SIN(OK0) + SIN(OW0)*COS(OO0)
      R(2,3) =  COS(OW0)*SIN(OO0)*SIN(OK0) + SIN(OW0)*COS(OO0)
      R(3,1) =  SIN(OW0)*COS(OO0)*SIN(OK0) + COS(OW0)*SIN(OO0)

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ภาคผนวก ก (ต่อ)

```

R(3,2) = -SIN(Omega) * COS(Omega)
R(3,3) = -SIN(Omega)*SIN(Omega)*SIN(Omega) + COS(Omega)*COS(Omega)
RETURN
END
*
*
* PMPROD
*
SUBROUTINE PMPROD(A,B,D,N,M,L)
DIMENSION A(N,M),B(M,L),D(N,L)
INTEGER N,M,L,I,J,K
DOUBLEPRECISION A,B,D
*
DO 10 I = 1,N
DO 10 J = 1,L
D(I,J) = 0.0
DO 10 K = 1,M
10 D(I,J) = D(I,J) + A(I,K)*B(K,J)
RETURN
END
*
*
* PMTRAN
*
SUBROUTINE PMTRAN(A,AT,N,M)
DIMENSION A(N,M),AT(M,N)
INTEGER N,M,I,J
DOUBLEPRECISION A,AT
DO 10 I = 1,N
DO 10 J = 1,M
10 AT(J,I) = A(I,J)
RETURN
END
*
*
* RESULT
*
SUBROUTINE RESULT(F0,A,DIF,N,MNE)
DIMENSION F0(21,1),A(21,7),DIF(7,1),UCC(7,1)
& ,ATA(7,7),AT(7,21),AINU(7,7)
INTEGER N,MNE,I,J,NNN
DOUBLEPRECISION F0,A,DIF,UCC,ATA,AT,AINU
*
NNN = N*3
I = 7
J = 1
MNE = 0
PRINT *, 'TRANSPOSE'
CALL PMTRAN(A,AT,NNN,I)
PRINT *, 'MULTIPLE'
CALL PMPROD(AT,A,ATA,I,NNN,I)
PRINT *, 'INVERSE'
CALL PMINV(ATA,AINU,I,MNE)
IF (MNE) 100,100,1000
100 PRINT *, 'MULTIPLE'
CALL PMPROD(AT,F0,UCC,I,NNN,J)
PRINT *, 'RESULT'
CALL PMPROD(AINU,UCC,DIF,I,I,J)
DIF(1,1) = - DIF(1,1)

```

ภาคผนวก ก (ต่อ)

```

DIF(2,1) = - DIF(2,1)
DIF(3,1) = - DIF(3,1)
DIF(4,1) = - DIF(4,1)
DIF(5,1) = - DIF(5,1)
DIF(6,1) = - DIF(6,1)
DIF(7,1) = - DIF(7,1)
*
GOTO 998
1000 WRITE(3,99)
99  FORMAT(1X,/// 'SINGULAR MATRIX')
998  RETURN
    END
*
*
* PMADD
*
SUBROUTINE PMADD(A,B,C,L,M)
DIMENSION A(L,M),B(L,M),C(L,M)
IMPLICIT INTEGER(I-N)
DOUBLEPRECISION A,B,C
*
DO 10 J = 1,M
DO 10 I = 1,L
10  C(I,J) = A(I,J) + B(I,J)
RETURN
END
*
*
* PMINU
*
SUBROUTINE PMINU(A,B,N,MNE)
DIMENSION A(N,N),B(N,N)
IMPLICIT INTEGER(I-N)
DOUBLEPRECISION A,B,DEL,AMAX,BTMP,ATMP,AMULT,DIV
*
DO 5 I = 1,N
DO 5 J = 1,N
IF (I-J) 4,3,4
3  B(I,J) = 1.
GOTO 5
4  B(I,J) = 0.
5  CONTINUE
*
DEL = 1.
*
DO 45 K = 1,N
IF (K-N) 12,30,30
12  IMAX = K
AMAX = DABS(A(K,K))
KP1 = K+1
DO 20 I = KP1,N
IF (AMAX-DABS(A(I,K))) 15,20,20
15  IMAX = I
AMAX = DABS(A(I,K))
20  CONTINUE
*
IF (IMAX - K) 25,30,25
25  DO 29 J = 1,N
ATMP = A(IMAX,J)
A(IMAX,J) = A(K,J)

```

ภาคผนวก ก (ต่อ)

```

      A(K,J) = ATMP
      BTMP = B(IMAX,J)
      B(IMAX,J) = B(K,J)
29      B(K,J) = BTMP
      DEL = -DEL
*
30      continue
*
      IF(DABS(A(K,K)) - 0.000000000001) 93,93,35
35      DEL = A(K,K)+DEL
      DIM = A(K,K)
      DO 38 J = 1,N
          A(K,J) = A(K,J)/DIM
38      B(K,J) = B(K,J)/DIM
      DO 43 I = 1,N
          AMULT = A(I,K)
          IF (I-K) 39,43,39
39      DO 42 J = 1,N
          A(I,J) = A(I,J) - AMULT*A(K,J)
          B(I,J) = B(I,J) - AMULT*B(K,J)
42      CONTINUE
43      CONTINUE
45      CONTINUE
*
      GOTO 99
*
93      MNE = K
99      RETURN
      END

```

ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

ภาคผนวก ก (ต่อ)

N = 7

DATA

1	X	1900.11000	1904.15000
	Y	269.48000	966.91100
	Z	970.86500	270.98100
2	X	1936.52500	1988.98300
	Y	271.34200	1113.92700
	Z	1118.37000	271.52300
3	X	1904.38000	1908.97600
	Y	269.76500	959.48700
	Z	963.71400	270.22600
4	X	1933.25000	1984.94700
	Y	291.83600	1211.21400
	Z	1216.13800	281.78400
5	X	1654.99000	1659.89200
	Y	231.91700	1006.89000
	Z	1012.03700	232.24100
6	X	1548.22300	1554.56200
	Y	301.14100	1051.09100
	Z	1056.41600	301.26600
7	X	1697.76700	1702.90800
	Y	298.33700	1260.11300
	Z	1267.35400	298.24000

Initial Iteration

Parameter

S0	=	.99376
W0	=	.98888
M0	=	.88888
K0	=	.88888
X0	=	15.90172
Y0	=	2.10370
Z0	=	2.20242

Difference

DS	=	-.00097
DW	=	-.00147
DM	=	.00543
DK	=	.00023
DX	=	7.93582
DY	=	-11.50771
DZ	=	2.05212

ภาคผนวก ก (ต่อ)

Iteration no. 1

Parameter

S0	=	.99279
W0	=	-.00147
M0	=	.00643
K0	=	.00023
X0	=	23.93754
Y0	=	-9.40401
Z0	=	4.25454

Difference

DS	=	.00000
DW	=	.00000
DM	=	.00001
DK	=	-.00001
DX	=	.00024
DY	=	.00189
DZ	=	-.00936

Iteration no. 2

Parameter

S0	=	.99281
W0	=	-.00148
M0	=	.00643
K0	=	.00022
X0	=	23.94077
Y0	=	-9.40212
Z0	=	4.24468

Difference

DS	=	.00000
DW	=	.00000
DM	=	.00000
DK	=	.00000
DX	=	.00001
DY	=	-.00001
DZ	=	-.00001

ศูนย์วิทยุโทรศักร
จุฬาลงกรณ์มหาวิทยาลัย

ภาคผนวก ก (ต่อ)

Parameter

S0 = .99231
 M0 = -.00148
 M0 = .00043
 K0 = .00022
 X0 = 23.84077
 Y0 = -9.40212
 Z0 = 4.24468

Ground Coordinates:		Computed	Control	Residuals
1	X =	1904.10658	1904.15600	-.04938
	Y =	966.99348	966.91100	.08250
	Z =	269.93786	270.00100	-.06314
2	X =	1988.95665	1988.98300	-.02630
	Y =	1113.98946	1113.92700	.06246
	Z =	271.55104	271.52300	.02804
3	X =	1809.04107	1808.97600	.06512
	Y =	959.28244	959.48700	-.20454
	Z =	270.19326	270.22600	-.03274
4	X =	1985.08597	1984.84700	.23902
	Y =	1211.04685	1211.21400	-.16713
	Z =	281.79736	281.78400	.01336
5	X =	1660.49373	1659.89200	.60177
	Y =	1006.31117	1006.09000	.22118
	Z =	282.28028	282.24100	.03928
6	X =	1554.20438	1554.56200	-.35758
	Y =	1051.71184	1051.39100	.32086
	Z =	301.32212	301.26600	.05612
7	X =	1701.53532	1702.00800	-.47264
	Y =	1259.79763	1260.11300	-.31534
	Z =	298.19909	298.24000	-.04091

Model Coordinates

Ground Coordinates

10001	X =	1900.11000	1904.10658
	Y =	269.48000	966.99348
	Z =	970.86500	269.93786
10002	X =	1986.52500	1988.95665
	Y =	271.34200	1113.98946
	Z =	1118.37000	271.55104
10003	X =	1804.30800	1809.04107
	Y =	269.70500	959.28244
	Z =	963.71400	270.19326
10004	X =	1983.25300	1985.08597
	Y =	281.80600	1211.04685
	Z =	1216.13800	281.79736
10005	X =	1654.99000	1660.49373
	Y =	281.91700	1006.31117
	Z =	1012.02700	282.28028
10007	X =	1548.22300	1554.20438
	Y =	301.14100	1051.71184
	Z =	1058.41600	301.32212
10008	X =	1697.96700	1701.53532
	Y =	298.33700	1259.79763
	Z =	1267.05400	298.19909



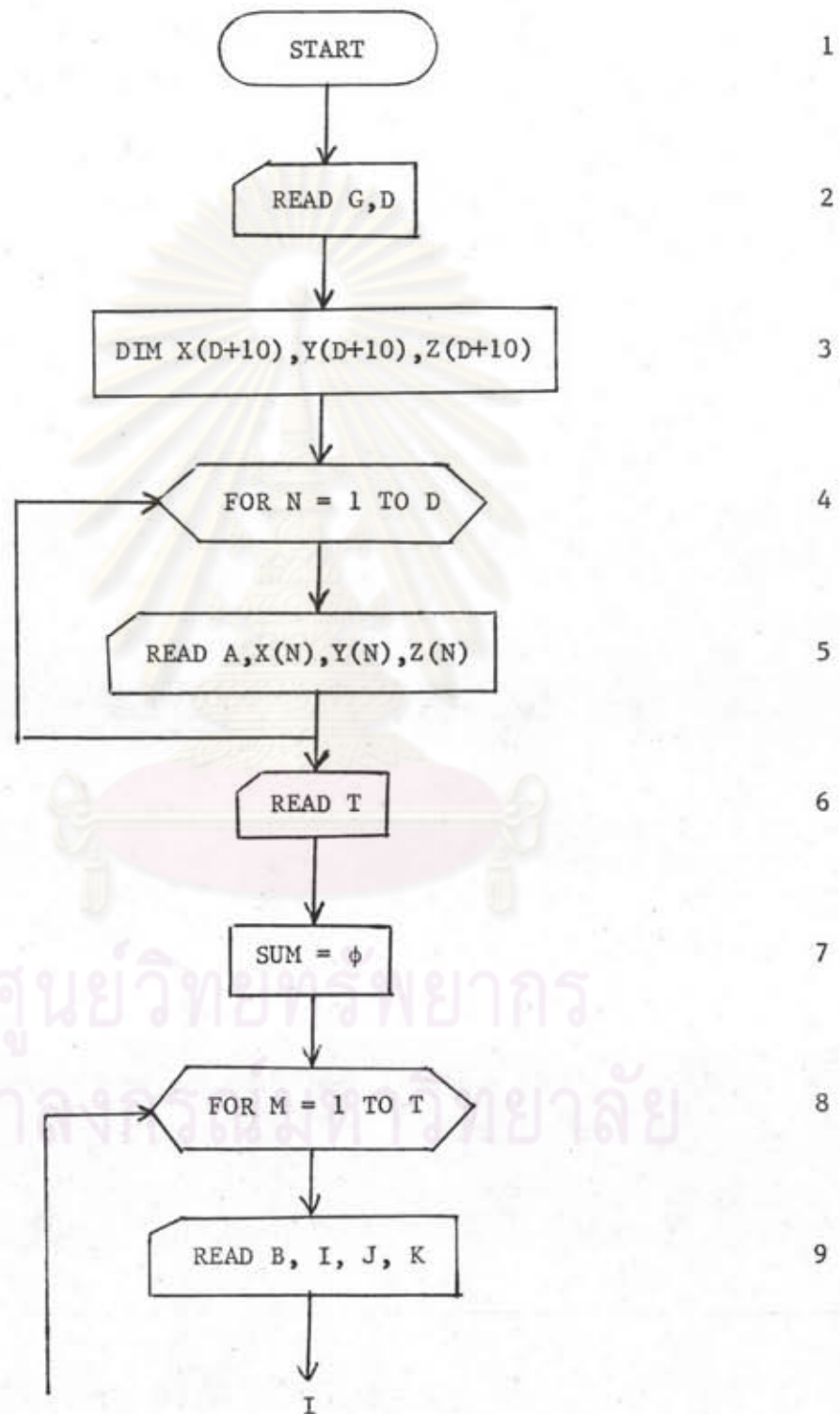
ภาคผนวก ข

การคำนวณปริมาณแรงงานดิน

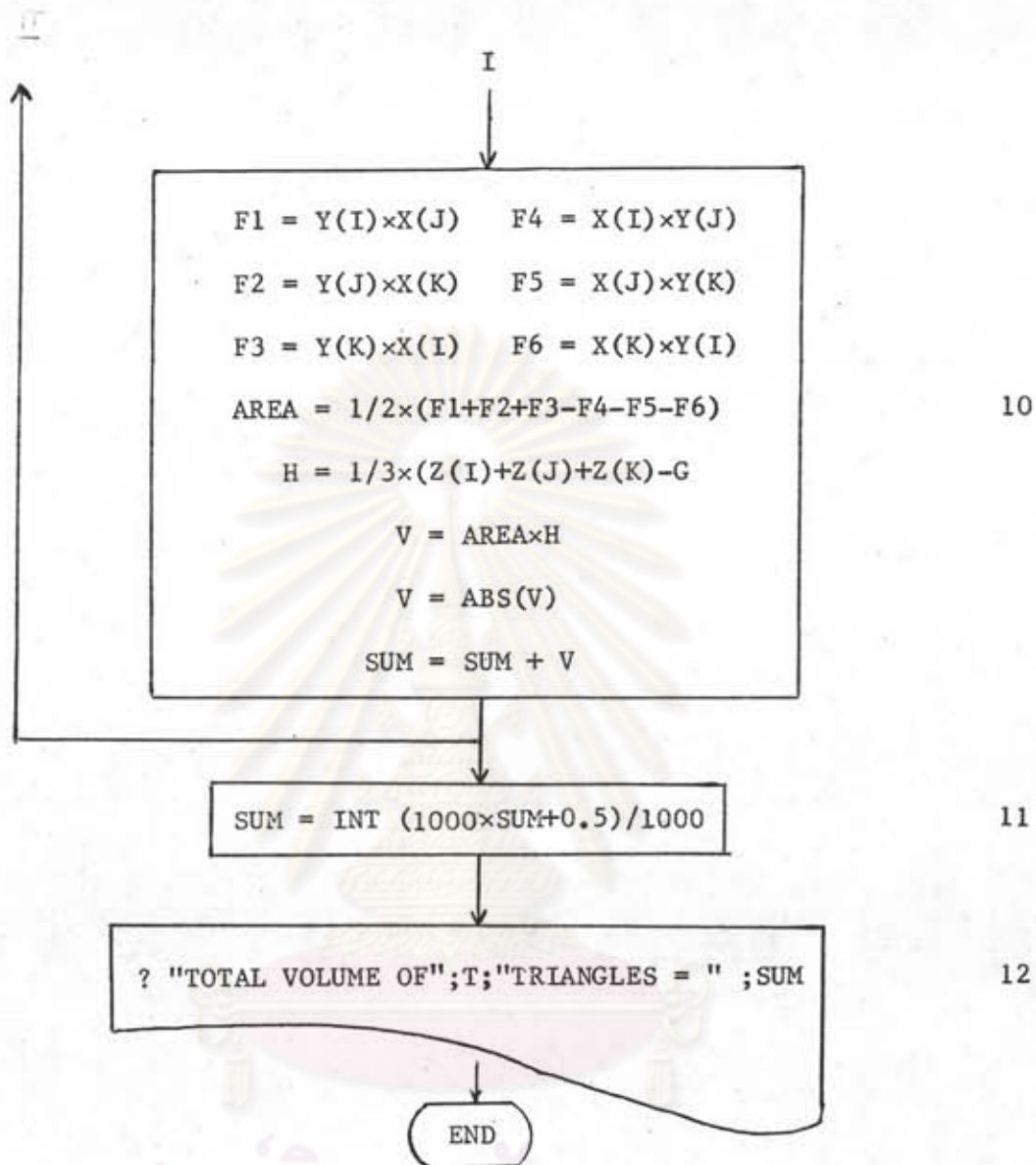
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ภาคผนวก ข

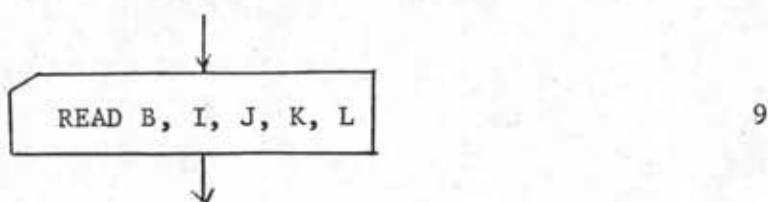
FLOW CHART แสดงขั้นตอนการคำนวณหาปริมาตรดิน (จากระดับที่กำหนด)



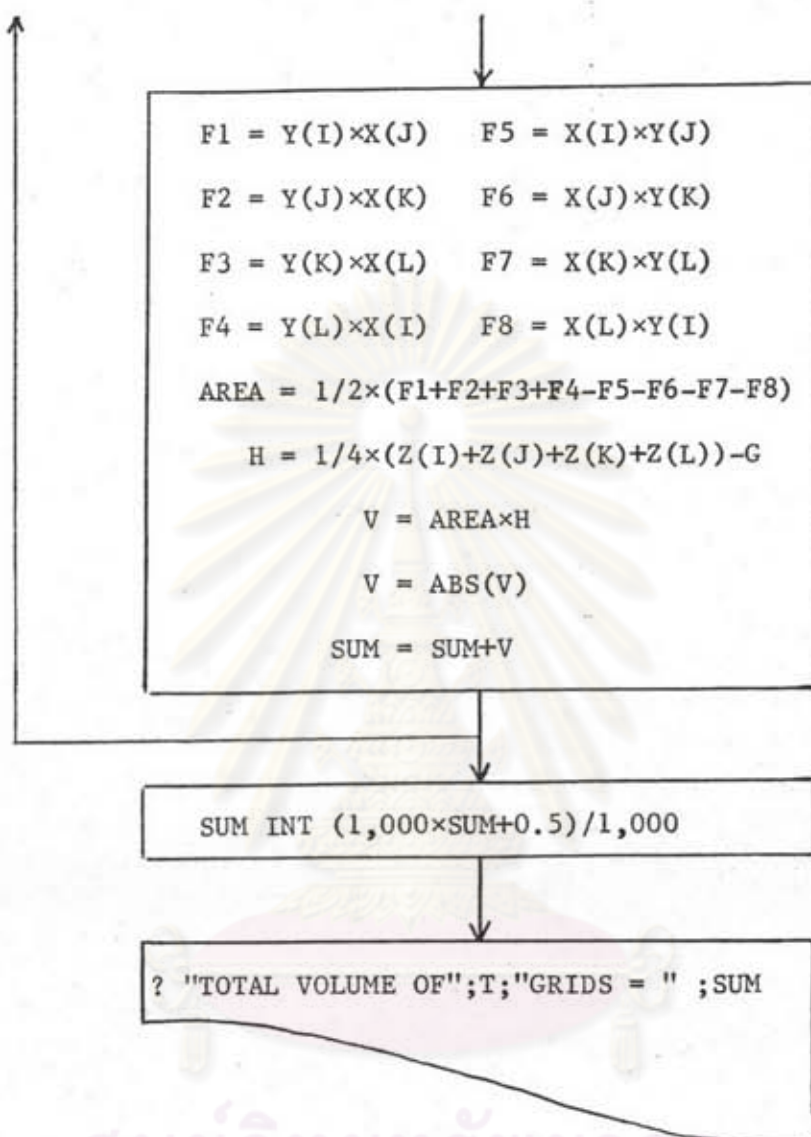
ภาคผนวก ข (ต่อ)



หมายเหตุ จาก FLOW CHART ที่แสดงเป็นการหาปริมาตรดิน จากการสมมติโมเดล เป็นสามเหลี่ยม แต่ถ้าโมเดลเป็นสี่เหลี่ยมก็จะมีแผนภูมิคล้าย ๆ กัน จะต่างกันก็ในลำดับที่ 9, 10, 12 ซึ่งต้องเปลี่ยนเป็นดังนี้



ภาคผนวก ข (ต่อ)



10

12

ภาคผนวก ข (ต่อ)

IPUKE 1657,120

LIST



```

100 HOME
150 READ B,D
200 DIM X(D + 10),Y(D + 10),Z(D + 10)
250 FOR N = 1 TO D
300 READ A,X(N),Y(N),Z(N)
350 NEXT N
400 READ T
450 INVERSE : VTAB 7: SPEED= 150: GOSUB 9250: NORMAL
500 VTAB 10: HTAB 13: PRINT "NO. OF DATA = ";D
550 VTAB 12: HTAB 12: PRINT "NO. OF GRIDS = ";T
600 VTAB 14: HTAB 11: PRINT "GIVEN ELEVATION = ";G
650 INVERSE : VTAB 17: GOSUB 9250: NORMAL : SPEED= 255: PRINT : PRINT : PRINT
700 SPEED= 150: HTAB 4: PRINT "DO YOU WANT TO CHECK DATA?<Y/N>": VTAB PEEK (37)
): HTAB 35: INPUT " ";N#: SPEED=
255: PRINT : PRINT
750 IF N# = "Y" THEN 850
800 GOTO 1950
850 HOME : INPUT "NO. OF BEGINNING DATA = ";C: PRINT
900 INPUT "NO. OF END DATA = ";E: PRINT
950 IF C < 1 OR C > D THEN 1150
1000 IF E < 1 OR E > D THEN 1150
1050 IF C > E THEN 1150
1100 GOTO 1450
1150 HOME : SPEED= 150: VTAB 6: GOSUB 9450: VTAB 8: HTAB 8: PRINT "NO. OF BEGINNING DATA = C": PRINT
1200 HTAB 11: PRINT "NO. OF END DATA = E": PRINT
1250 HTAB 5: PRINT "(C) AND (E) ARE BETWEEN 1 TO";" ";D: PRINT
1300 HTAB 11: PRINT "E IS GREATER THAN C": PRINT : GOSUB 9450
1350 FLASH : VTAB 21: HTAB 8: PRINT "PRESS ANY KEY TO CONTINUE": HOME : VTAB PEEK (37): HTAB 5: GET M: SPEED=
255
1450 GOTO 850
1500 INVERSE : GOSUB 9250: NORMAL
1550 INVERSE : PRINT TAB(5)"NO. "; SPEED(5);"X(D)"; SPEED(6);"Y(D)"; SPEED(7);"Z(D)"; NORMAL
1600 VTAB 7: INVERSE : GOSUB 9250: NORMAL : PRINT : PEEK 34,8
1650 FOR J = C TO E
1650 HTAB 3: PRINT J;: HTAB 11: PRINT X(J);: HTAB 21: PRINT Y(J);: HTAB 31: PRINT Z(J)
1700 IF PEEK (37) = 21 THEN VTAB ( PEEK (37) + 1): HTAB 59: GET N#: HOME : VTAB 9
1750 NEXT J
1800 SPEED= 150: VTAB 23: HTAB 5: PRINT "DO YOU WANT TO CHECK AGAIN?<Y/N>": VTAB PEEK (37): HTAB 35: INPUT " ";
N#
1850 SPEED= 255: PEEK 34,0
1900 IF N# = "Y" THEN 850
1950 HOME : SPEED= 150: VTAB 11: HTAB 9: PRINT "***ANY CORRECTION?<Y/N>": VTAB 11: HTAB 32: INPUT " ";Y#: SPEED=
255
2000 IF Y# = "Y" THEN 2100
2050 GOTO 4350
2100 HOME : SPEED= 150
2150 VTAB 9: HTAB 8: PRINT "PRESS L1 TO CORRECT X(D)"
2200 VTAB 12: HTAB 8: PRINT "PRESS L2 TO CORRECT Y(D)"
2250 VTAB 15: HTAB 9: PRINT "PRESS L3 TO CORRECT Z(D)"

```

ภาคผนวก ข (ต่อ)

```

: PRINT
2300 HTAB 9: PRINT "WHICH IS YOU CHOICE?": VTAB PEEK (37): HTAB 29: INPUT " ";
K: SPEED= 255
2350 HOME: GOTO 2100
2400 IF K < 1 OR K > 3 THEN 2100
2450 IF K = 1 THEN 2550
2500 GOTO 3100
2550 HOME : SPEED= 150: HTAB 13: PRINT "CORRECTION X(I)"
2600 HTAB 13: PRINT "-----": PRINT
2650 HTAB 3: PRINT "DO NOT ANY MORE<PRESS NO. OF DATA=0>": PRINT
2700 INVERSE : SPEED= 255: GOSUB 9250
2750 PRINT TAB( 3)"NO. OF DATA": SPC( 4);"OLD DATA": SPC( 4);"NEW DATA"
2800 VTAB 8: GOSUB 9250: NORMAL : PRINT : POKE 34,9
2850 HTAB 6: INPUT " ";I
2900 IF I = 0 THEN POKE 34,0: GOTO 1950
2950 IF I > 0 THEN GOSUB 9650: GOTO 2550
3000 VTAB PEEK (37): HTAB 18: PRINT X(I): VTAB PEEK (37): HTAB 29: INPUT " ";
X(I): PRINT
3050 GOTO 2850
3100 IF K = 2 THEN 3200
3150 GOTO 3750
3200 HOME : SPEED= 150: HTAB 13: PRINT "CORRECTION Y(I)"
3250 HTAB 13: PRINT "-----": PRINT
3300 HTAB 3: PRINT "DO NOT ANY MORE<PRESS NO. OF DATA=0>": PRINT
3350 INVERSE : SPEED= 255: GOSUB 9250
3400 PRINT TAB( 3)"NO. OF DATA": SPC( 4);"OLD DATA": SPC( 4);"NEW DATA"
3450 VTAB 8: GOSUB 9250: NORMAL : PRINT : POKE 34,9
3500 HTAB 6: INPUT " ";I
3550 IF I = 0 THEN POKE 34,0: GOTO 1950
3600 IF I > 0 THEN GOSUB 9650: GOTO 3200
3650 VTAB PEEK (37): HTAB 18: PRINT Y(I): VTAB PEEK (37): HTAB 29: INPUT " ";
Y(I): PRINT
3700 GOTO 3500
3750 IF K = 3 THEN 3800
3800 HOME : SPEED= 150: HTAB 13: PRINT "CORRECTION Z(I)"
3850 HTAB 13: PRINT "-----": PRINT
3900 HTAB 3: PRINT "DO NOT ANY MORE<PRESS NO. OF DATA=0>": PRINT
3950 INVERSE : SPEED= 255: GOSUB 9250
4000 PRINT TAB( 3)"NO. OF DATA": SPC( 4);"OLD DATA": SPC( 4);"NEW DATA"
4050 VTAB 8: GOSUB 9250: NORMAL : PRINT : POKE 34,9
4100 HTAB 6: INPUT " ";I
4150 IF I = 0 THEN POKE 34,0: GOTO 1950
4200 IF I > 0 THEN GOSUB 9650: GOTO 3800
4250 VTAB PEEK (37): HTAB 18: PRINT Z(I): VTAB PEEK (37): HTAB 29: INPUT " ";
Z(I): PRINT
4300 GOTO 4100
4350 HOME : VTAB 12: HTAB 6: PRINT : SPEED= 150: PRINT "THE PERIOD OF THE
NOW !!": SPEED= 255: NORMAL
4400 SUM = 0: ZZZ = 0
4450 FOR M = 1 TO 1
4500 READ B,I,J,K,L
4550 F1 = Y(I) * X(J)
4600 F2 = Y(J) * X(K)
4650 F3 = Y(K) * X(L)
4700 F4 = Y(L) * X(I)
4750 F5 = X(I) * Y(J)
4800 F6 = X(J) * Y(K)
4850 F7 = X(K) * Y(L)
4900 F8 = X(L) * Y(I)
4950 AREA = 1 / 2 * (F1 + F2 + F3 + F4 - F5 - F6 - F7 - F8)
5000 H = 1 / 4 * (Z(I) + Z(J) + Z(K) + Z(L)) - G
5025 AREA = ABS (AREA): ZZZ = ZZZ + AREA
5050 V = AREA * H
5100 V = ABS (V)
5150 SUM = SUM + V
5200 NEXT M

```

ภาคผนวก ข (ต่อ)

```

5200 NEXT N
5250 HOME : VTAB 6: INVERSE : SPEED= 150: GOSUB 9250: NORMAL
5300 SUM = INT (1000 * SUM + 0.5) / 1000
5325 ZZZ = INT (1000 * ZZZ + 0.5) / 1000
5340 VTAB 9: PRINT "TOTAL AREA OF ";T;" GRIDS = ";ZZZ
5350 VTAB 12: PRINT "TOTAL VOLUME OF ";T;" GRIDS = ";SUM
5400 INVERSE : VTAB 15: GOSUB 9250: NORMAL : PRINT : PRINT : PRINT : PRINT : PR
INI
5450 HTAB 5: PRINT "DO YOU WANT TO RUN AGAIN?<Y/N>": VTAB PEF (37): HTAB 35:
INPUT " ";Y#: SPEED= 255
5500 IF Y# = "Y" THEN RUN
5550 PRINT CHR# (4);"RUN EARTH VOLUME"
5600 END
5650 DATA 275,342,1,1590,1030,282.581, 2,1570,1035,282.432, 3,1560,1040,282
.335, 4,1600,1010,282.481, 5,1600
,1015,283.056, 6,1600,1020,282.994, 7,1600,1025,282.835, 8,1600,1030,282.577
, 9,1600,1035,282.451
5700 DATA 10,1600,1040,282.326, 11,1600,1045,282.458, 12,1600,1050,282.539, 13
,1600,1055,282.734, 14,1600,1060,
282.218, 15,1610,1010,282.647, 16,1610,1015,282.385, 17,1610,1020,282.557, 1
8,1610,1025,282.498, 19,1610,1030
,282.492
5750 DATA 20,1610,1035,282.365, 21,1610,1040,282.293, 22,1610,1045,282.295, 2
3,1610,1050,282.417, 24,1610,1055
,282.458, 25,1610,1060,282.857, 26,1610,1065,282.385, 27,1620,1005,281.459,
28,1620,1010,281.786
5800 DATA 29,1620,1015,282.127, 30,1620,1020,282.284, 31,1620,1025,282.338, 3
2,1620,1030,282.213, 33,1620,1035
,282.105, 34,1620,1040,282.109, 35,1620,1045,281.995, 36,1620,1050,281.936,
37,1620,1055,281.894
5850 DATA 38,1620,1060,281.769, 39,1620,1065,281.913, 40,1620,1070,282.026, 4
1,1620,1075,282.714, 42,1620,1080
,282.562, 43,1620,1085,282.758, 44,1620,1090,282.949, 45,1630,1005,282.736,
46,1630,1010,282.681
5900 DATA 47,1630,1015,281.964, 48,1630,1020,282.072, 49,1630,1025,282.045, 5
0,1630,1030,282.068, 51,1630,1035
,282.079, 52,1630,1040,282.127, 53,1630,1045,281.963, 54,1630,1050,281.764,
55,1630,1055,281.637
5950 DATA 56,1630,1060,281.623, 57,1630,1065,281.638, 58,1630,1070,281.753, 5
9,1630,1075,281.536, 60,1630,1080
,281.661, 61,1630,1085,281.838, 62,1630,1090,282.027, 63,1630,1095,282.917,
64,1630,1100,283.029
6000 DATA 65,1640,1035,281.668, 66,1640,1040,281.883, 67,1640,1045,281.513, 6
8,1640,1050,281.746, 69,1640,1055
,281.864, 70,1640,1060,281.892, 71,1640,1065,281.931, 72,1640,1070,281.843,
73,1640,1075,281.812
6050 DATA 74,1640,1080,281.718, 75,1640,1085,281.503, 76,1640,1090,281.467, 77
,1640,1095,281.536, 78,1640,1100,
281.463, 79,1640,1105,281.446, 80,1640,1110,281.493, 81,1640,1115,281.653, 8
2,1640,1120,281.673
6100 DATA 83,1640,1125,281.667, 84,1640,1130,281.687, 85,1640,1135,281.593, 8
6,1640,1140,282.407, 87,1640,1145
,282.846, 88,1640,1150,282.693, 89,1650,1035,281.581, 90,1650,1040,281.503,
91,1650,1045,281.385
6150 DATA 92,1650,1050,281.683, 93,1650,1055,281.694, 94,1650,1060,281.732, 9
5,1650,1065,281.687, 96,1650,1070
,281.553, 97,1650,1075,281.452, 98,1650,1080,281.356, 99,1650,1085,281.284,
100,1650,1090,281.314
6200 DATA 101,1650,1095,281.302, 102,1650,1100,281.346, 103,1650,1105,281.4
25, 104,1650,1110,281.467, 105,16
50,1115,281.493, 106,1650,1120,281.473, 107,1650,1125,281.432, 108,1650
,1130,281.516, 109,1650,1135,28
1.498
6250 DATA 110,1650,1140,281.684, 111,1650,1145,281.882, 112,1650,1150,282.49
5, 113,1650,1155,282.753, 114,165
0,1160,282.791, 115,1660,1035,281.256, 116,1660,1040,281.221, 117,1660,1
045,281.130

```

ภาคผนวก ข (ต่อ)

6300	DATA	118,1660,1050,281.325, 119,1660,1055,281.192, 120,1660,1060,281.285, 121,1660,1065,281.387, 122,1660,1070,281.402, 123,1660,1075,281.335, 124,1660,1080,281.322, 125,1660,1085,281.263, 126,1660,1090,281.24
6350	DATA	127,1660,1095,281.324, 128,1660,1100,281.314, 129,1660,1105,281.325, 130,1660,1110,281.304, 131,1660,1115,281.507, 132,1660,1120,281.197, 133,1660,1125,281.226, 134,1660,1130,281.305
6400	DATA	135,1660,1135,281.382, 136,1660,1140,281.512, 137,1660,1145,281.605, 138,1660,1150,281.673, 139,1660,1155,281.804, 140,1660,1160,282.773, 141,1660,1165,282.935
6450	DATA	142,1670,1030,281.213, 143,1670,1035,281.026, 144,1670,1040,280.816, 145,1670,1045,280.906, 146,1670,1050,281.025, 147,1670,1055,281.023, 148,1670,1060,281.163, 149,1670,1065,281.177
6500	DATA	150,1670,1070,281.113, 151,1670,1075,281.073, 152,1670,1080,281.097, 153,1670,1085,281.058, 154,1670,1090,281.022, 155,1670,1095,281.084, 156,1670,1100,281.155, 157,1670,1105,281.173, 158,1670,1110,281.135
6550	DATA	159,1670,1115,281.091, 160,1670,1120,281.068, 161,1670,1125,281.045, 162,1670,1130,281.162, 163,1670,1135,281.192, 164,1670,1140,281.271, 165,1670,1145,281.441, 166,1670,1150,281.506
6600	DATA	167,1670,1155,281.493, 168,1670,1160,281.663, 169,1670,1165,281.716, 170,1670,1170,281.77
6650	DATA	171,1670,1175,283.014, 172,1670,1180,282.887, 173,1670,1185,282.790, 174,1680,1035,280.472, 175,1680,1040,280.635, 176,1680,1045,280.735, 177,1680,1050,280.956, 178,1680,1055,280.967, 179,1680,1060,281.063, 180,1680,1065,281.077, 181,1680,1070,281.056, 182,1680,1075,280.935
6700	DATA	183,1680,1080,280.881, 184,1680,1085,280.874, 185,1680,1090,280.906, 186,1680,1095,280.876, 187,1680,1100,280.946, 188,1680,1105,280.992, 189,1680,1110,280.995, 190,1680,1115,280.993, 191,1680,1120,280.924
6750	DATA	192,1680,1125,280.943, 193,1680,1130,280.974, 194,1680,1135,281.132, 195,1680,1140,281.322, 196,1680,1145,281.402, 197,1680,1150,281.516, 198,1680,1155,281.596, 199,1680,1160,281.659, 200,1680,1165,281.671
6800	DATA	201,1680,1170,281.673, 202,1680,1175,281.712, 203,1680,1180,281.678, 204,1680,1185,281.962
6850	DATA	205,1690,1095,280.902, 206,1690,1100,280.846, 207,1690,1105,280.843, 208,1690,1110,281.883, 209,1690,1115,280.879, 210,1690,1120,280.884, 211,1690,1125,280.902, 212,1690,1130,280.823, 213,1690,1135,280.976
6900	DATA	214,1690,1140,281.002, 215,1690,1145,281.085, 216,1690,1150,281.395, 217,1690,1155,281.567, 218,1690,1160,281.606, 219,1690,1165,281.734, 220,1690,1170,281.631, 221,1690,1175,281.762
6950	DATA	222,1690,1180,281.756, 223,1690,1185,281.894, 224,1690,1190,281.912, 225,1700,1095,281.054, 226,1700,1100,280.923, 227,1700,1105,280.893, 228,1700,1110,280.843, 229,1700,1115,280.812
7000	DATA	230,1700,1120,280.849, 231,1700,1125,280.833, 232,1700,1130,280.895, 233,1700,1135,280.912, 234,1700,1140,280.974, 235,1700,1145,281.012, 236,1700,1150,281.039, 237,1700,1155,281.527
7050	DATA	238,1700,1160,281.556, 239,1700,1165,281.624, 240,1700,1170,281.662, 241,1700,1175,281.723, 242,1700,1180,281.795, 243,1700,1185,281.993
7100	DATA	244,1710,1095,280.819, 245,1710,1100,281.012, 246,1710,1105,280.943, 247,1710,1110,280.892, 248,1710,1115,280.873, 249,1710,1120,280.857, 250,1710,1125,280.851, 251,1710,1130,280.845, 252,1710,1135,280.839, 253,1710,1140,280.833, 254,1710,1145,280.827, 255,1710,1150,280.821, 256,1710,1155,280.815, 257,1710,1160,280.809, 258,1710,1165,280.803, 259,1710,1170,280.797, 260,1710,1175,280.791, 261,1710,1180,280.785, 262,1710,1185,280.779, 263,1710,1190,280.773, 264,1710,1195,280.767, 265,1710,1200,280.761, 266,1710,1205,280.755, 267,1710,1210,280.749, 268,1710,1215,280.743, 269,1710,1220,280.737, 270,1710,1225,280.731, 271,1710,1230,280.725, 272,1710,1235,280.719, 273,1710,1240,280.713, 274,1710,1245,280.707, 275,1710,1250,280.701, 276,1710,1255,280.695, 277,1710,1260,280.689, 278,1710,1265,280.683, 279,1710,1270,280.677, 280,1710,1275,280.671, 281,1710,1280,280.665, 282,1710,1285,280.659, 283,1710,1290,280.653, 284,1710,1295,280.647, 285,1710,1300,280.641, 286,1710,1305,280.635, 287,1710,1310,280.629, 288,1710,1315,280.623, 289,1710,1320,280.617, 290,1710,1325,280.611, 291,1710,1330,280.605, 292,1710,1335,280.599, 293,1710,1340,280.593, 294,1710,1345,280.587, 295,1710,1350,280.581, 296,1710,1355,280.575, 297,1710,1360,280.569, 298,1710,1365,280.563, 299,1710,1370,280.557, 300,1710,1375,280.551, 301,1710,1380,280.545, 302,1710,1385,280.539, 303,1710,1390,280.533, 304,1710,1395,280.527, 305,1710,1400,280.521, 306,1710,1405,280.515, 307,1710,1410,280.509, 308,1710,1415,280.503, 309,1710,1420,280.497, 310,1710,1425,280.491, 311,1710,1430,280.485, 312,1710,1435,280.479, 313,1710,1440,280.473, 314,1710,1445,280.467, 315,1710,1450,280.461, 316,1710,1455,280.455, 317,1710,1460,280.449, 318,1710,1465,280.443, 319,1710,1470,280.437, 320,1710,1475,280.431, 321,1710,1480,280.425, 322,1710,1485,280.419, 323,1710,1490,280.413, 324,1710,1495,280.407, 325,1710,1500,280.401, 326,1710,1505,280.395, 327,1710,1510,280.389, 328,1710,1515,280.383, 329,1710,1520,280.377, 330,1710,1525,280.371, 331,1710,1530,280.365, 332,1710,1535,280.359, 333,1710,1540,280.353, 334,1710,1545,280.347, 335,1710,1550,280.341, 336,1710,1555,280.335, 337,1710,1560,280.329, 338,1710,1565,280.323, 339,1710,1570,280.317, 340,1710,1575,280.311, 341,1710,1580,280.305, 342,1710,1585,280.299, 343,1710,1590,280.293, 344,1710,1595,280.287, 345,1710,1600,280.281, 346,1710,1605,280.275, 347,1710,1610,280.269, 348,1710,1615,280.263, 349,1710,1620,280.257, 350,1710,1625,280.251, 351,1710,1630,280.245, 352,1710,1635,280.239, 353,1710,1640,280.233, 354,1710,1645,280.227, 355,1710,1650,280.221, 356,1710,1655,280.215, 357,1710,1660,280.209, 358,1710,1665,280.203, 359,1710,1670,280.197, 360,1710,1675,280.191, 361,1710,1680,280.185, 362,1710,1685,280.179, 363,1710,1690,280.173, 364,1710,1695,280.167, 365,1710,1700,280.161, 366,1710,1705,280.155, 367,1710,1710,280.149, 368,1710,1715,280.143, 369,1710,1720,280.137, 370,1710,1725,280.131, 371,1710,1730,280.125, 372,1710,1735,280.119, 373,1710,1740,280.113, 374,1710,1745,280.107, 375,1710,1750,280.101, 376,1710,1755,280.095, 377,1710,1760,280.089, 378,1710,1765,280.083, 379,1710,1770,280.077, 380,1710,1775,280.071, 381,1710,1780,280.065, 382,1710,1785,280.059, 383,1710,1790,280.053, 384,1710,1795,280.047, 385,1710,1800,280.041, 386,1710,1805,280.035, 387,1710,1810,280.029, 388,1710,1815,280.023, 389,1710,1820,280.017, 390,1710,1825,280.011, 391,1710,1830,280.005, 392,1710,1835,280.000, 393,1710,1840,280.000, 394,1710,1845,280.000, 395,1710,1850,280.000, 396,1710,1855,280.000, 397,1710,1860,280.000, 398,1710,1865,280.000, 399,1710,1870,280.000, 400,1710,1875,280.000

ภาคผนวก ข (ต่อ)

246,1710,1110,200.043, 247,1710,1120,280.834, 250,1710,1120,280.783,
 251,1710,1130,280.772
 7150 DATA 252,1710,1135,280.810, 253,1710,1140,280.843, 254,1710,1145,2
 80.843, 255,1710,1150,280.951,
 256,1710,1155,281.192, 257,1710,1160,281.394, 258,1710,1165,281.456,
 259,1710,1170,281.512
 7200 DATA 260,1710,1175,281.586, 261,1710,1180,281.572, 262,1710,1185,2
 81.985, 263,1720,1145,281.347,
 264,1720,1150,280.782, 265,1720,1155,281.054, 266,1720,1160,281.227,
 267,1720,1165,281.293
 7250 DATA 268,1720,1170,281.324, 269,1720,1175,281.358, 270,1720,1180,
 281.405, 271,1720,1185,281.093,
 272,1720,1190,281.472, 273,1730,1160,281.083, 274,1730,1165,281.093,
 275,1730,1170,282.334
 7300 DATA 276,1680,1185,281.523, 277,1680,1190,281.493, 278,1680,1195,2
 81.504, 279,1680,1200,281.534,
 280,1680,1205,281.712, 281,1680,1210,281.812, 282,1680,1215,281.776,
 283,1680,1220,281.642
 7350 DATA 284,1680,1225,281.662, 285,1680,1230,281.504, 286,1680,1235
 ,281.615
 7400 DATA 287,1690,1185,281.723, 288,1690,1190,281.596, 289,1690,1195,281.58
 8, 290,1690,1200,281.463, 291,169
 0,1205,281.367, 292,1690,1210,281.528,293,1690,1215,281.654, 294,1690,1220,2
 81.679, 295,1690,1225,281.692
 7450 DATA 296,1690,1230,281.699,297,1690,1235,281.738,298,1690,1240,281.694,
 299,1690,1245,281.742,300,1700,11
 85,281.374,301,1700,1190,281.378,302,1700,1195,281.337,303,1700,1200,281.391
 ,304,1700,1205,281.385
 7500 DATA 305,1700,1210,281.396, 306,1700,1215,281.572, 307,1700,1220,
 281.462
 7550 DATA 308,1700,1225,281.274, 309,1700,1230,280.898, 310,1700,1235,2
 80.983, 311,1700,1240,280.921,
 312,1700,1245,280.951, 313,1700,1250,280.386, 314,1700,1255,280.047
 7600 DATA 315,1710,1185,281.507, 316,1710,1190,281.379, 317,1710,1195,28
 1.368, 318,1710,1200,281.385,
 319,1710,1205,281.304, 320,1710,1210,281.237, 321,1710,1215,281.783,
 322,1710,1220,281.274
 7650 DATA 323,1710,1225,281.283, 324,1710,1230,281.175, 325,1710,1235,281.104
 , 326,1710,1240,280.852, 327,1710
 ,1245,280.77, 328,1710,1250,280.893, 329,1710,1255,281.164, 330,1710,1260,
 281.544, 331,1710,1265,281.648
 7700 DATA 332,1720,1185,281.183,333,1720,1190,281.163,334,1720,1195,281.174,33
 5,1720,1200,281.093,336,1720,1205
 ,281.177,337,1720,1210,281.105,338,1720,1215,281.125,339,1720,1220,311.127,3
 40,1720,1225,281.062
 7750 DATA 341,1720,1230,280.916, 342,1720,1235,280.794
 7800 DATA 257,1,14,25,24,13, 2,13,24,23,12, 3,12,23,22,11, 4,11,22,21,1
 0, 5,10,21,20,9, 6,9,20,19,8,
 7,8,19,18,7, 8,7,18,17,6, 9,6,17,16,5, 10,5,16,15,4, 11,4,15,14,3,
 25, 12,25,38,37,24
 7850 DATA 13,24,37,36,23, 14,23,36,25,22, 15,22,35,24,21, 16,21,34,23,2
 0, 17,20,33,32,19, 18,19,32,3
 , 1,18, 19,18,31,30,17, 20,17,30,29,16, 21,16,29,28,15, 22,15,28,27,14,43
 , 23,43,61,60,42
 7900 DATA 24,42,60,59,41, 25,41,59,58,40, 26,40,58,57,39, 27,37,5
 7,56,38, 28,38,56,55,37, 2
 9,37,55,54,36, 30,36,54,53,35, 31,35,53,52,34, 32,34,52,51,33,
 33,33,51,50,32
 7950 DATA 34,32,50,49,31, 35,31,49,48,30, 36,30,48,47,29, 3,29,4
 7,46,28, 38,28,46,45,27,
 39,64,78,77,63, 40,63,77,76,62, 41,62,76,75,61, 42,61,75,74,60,
 43,60,74,73,59
 8000 DATA 44,59,73,72,58, 45,58,72,71,57, 46,57,71,70,56, 47,56,7
 0,69,55, 48,55,69,68,54,
 49,54,68,67,53, 50,53,67,66,52, 51,52,66,65,51, 52,65,64,63,51,111.87
 , 53,87,111,110,86

ภาคผนวก ข (ต่อ)

8050 DATA	54,86,110,109,85,	55,85,109,108,84,	56,84,108,107,83,	57,83,107,106,82,	58,82,106,105,81,	59,81,105,104,80,	60,80,104,103,79,	61,79,103,102,78,	62,78,102,101,77,	63,77,101,100,76
8100 DATA	64,76,100,99,75,	65,75,99,98,74,	66,74,98,97,73,	67,73,97,96,72,	68,72,96,95,71,	69,71,95,94,70,	70,70,94,93,69,	71,69,93,92,68,	72,68,92,91,67,	73,67,91,90,66,
	0,89,65	74,66,9								
8150 DATA	75,114,140,139,113,	76,113,139,138,112,	77,112,138,137,111,	78,111,137,136,110,	79,110,136,135,109,	80,109,135,134,108,	81,108,134,133,107,	82,107,133,132,106,	83,106,132,131,	84,105,131,130,104
8200 DATA	85,104,130,129,103,	86,103,129,128,102,	87,102,128,127,101,	88,101,127,126,100,	89,100,126,125,99,	90,99,125,124,98,	91,98,124,123,97,	92,97,123,122,96,	93,96,122,121,9	94,95,121,120,94
8250 DATA	95,94,120,119,93,	96,93,119,118,92,	97,92,118,117,91,	98,91,117,116,90,	99,90,116,115,89,	100,255,264,263,254				
8300 DATA	101,141,169,168,140,	102,140,168,167,139,	103,139,167,166,138,	104,138,166,165,137,	105,137,165,164,136,	106,136,164,163,135,	107,135,163,162,134,	108,134,162,133,	109,133,161,160,132	110,132,160,159,131,
8350 DATA	110,132,160,159,131,	111,131,159,158,130,	112,130,158,157,129,	113,129,157,156,128,	114,128,156,155,127,	115,127,155,154,126,	116,126,154,153,125,	117,125,153,152,124,	118,124,152,151,123	119,123,151,150,122,
8400 DATA	119,123,151,150,122,	120,122,150,149,121,	121,121,149,148,120,	122,120,148,147,119,	123,119,147,146,118,	124,118,146,145,117,	125,117,145,144,116,	126,116,144,143,115,	127,115,143,142,114,	128,114,142,141,113,
8450 DATA	128,172,203,202,171,	129,171,202,201,170,	130,170,201,200,169,	131,169,200,199,168,	132,168,199,198,167,	133,167,198,197,166,	134,166,197,196,165,	135,165,196,195,164,	136,164,195,194,193,162	137,162,193,192,161,
8500 DATA	137,162,193,192,161,	138,161,192,191,160,	139,160,191,190,159,	140,159,190,189,158,	141,158,189,188,157,	142,157,188,187,156,	143,156,187,186,155,	144,155,186,185,154,	145,154,185,184,153	146,153,184,183,152,
8550 DATA	145,153,184,183,152,	147,152,183,182,151,	148,151,182,181,150,	149,150,181,180,149,	150,149,180,179,148,	151,148,179,178,147,	152,147,178,177,146,	153,146,177,176,145,	154,145,176,175,144	155,144,175,174,143,
8600 DATA	155,144,175,174,143,	156,286,297,296,285,	157,285,296,295,284,	158,284,295,294,283,	159,283,294,282,	160,282,293,292,281,	161,281,292,291,280,	162,280,291,290,279,	163,279,290,289,278	164,278,289,288,277,
8650 DATA	164,278,289,288,277,	165,277,288,287,276,	166,276,287,286,275,	167,275,286,285,274,	168,274,285,284,273,	169,273,284,283,272,	170,272,283,282,271,	171,271,282,281,270,	172,270,281,280,279,	173,279,278,277,276,
8700 DATA	173,279,278,277,276,	174,196,215,214,195,	175,195,214,213,194,	176,194,213,212,193,	177,193,212,211,192,	178,192,211,210,191,	179,191,210,209,190,	180,190,209,208,189,	181,189,208,207,188	182,188,207,206,187,
8750 DATA	182,188,207,206,187,	183,187,206,205,186,	184,297,308,307,296,	185,296,309,308,295,	186,295,308,307,294,	187,294,307,306,293,	188,293,306,305,292,	189,292,305,304,291,	190,291,304,303,290	191,290,303,302,289,
8800 DATA	191,290,303,302,289,	192,289,302,301,288,	193,288,301,297,287,	194,287,300,299,286,	195,286,299,298,285,	196,285,298,297,284,	197,284,297,296,283,	198,283,296,295,282,	199,282,295,294,281,	200,281,294,293,280,

ภาคผนวก ข (ต่อ)

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211,212,170,221,271,270,220, 177,220,240,207,217, 170,217,207,206,210, 1
99,218,238,237,217

8850 DATA 200,217,237,236,216, 201,216,236,235,215, 202,215,235,234,214, 2
03,214,234,233,213, 204,213,233,
232,212, 205,212,232,231,211, 206,211,231,230,210, 207,210,230,229,209,
208,209,229,228,208

8900 DATA 209,208,228,227,207, 210,207,227,226,206, 211,206,226,225,205
8950 DATA 212,310,325,324,309, 213,309,324,323,308, 214,308,323,322,307,
215,307,322,321,306, 216,306
,321,320,305, 217,305,320,319,304, 218,304,319,318,303, 219,303,318,31
7,302, 220,302,317,316,301
9000 DATA 221,301,316,262,243, 222,243,262,261,242, 223,242,261,260,241,
224,241,260,259,240, 225,240,
259,258,239, 226,239,258,257,238, 227,238,257,256,237, 228,237,256,255
,236, 229,236,255,254,235
9050 DATA 230,235,254,253,234, 231,234,253,252,233, 232,233,252,251,232,
233,232,251,250,231, 234,231,
250,249,230, 235,230,249,248,229, 236,229,248,247,228, 237,228,247,246
,227, 238,227,246,245,226
9100 DATA 239,226,245,244,225, 240,325,342,341,324, 241,324,341,340,323,
242,323,340,339,322, 243,322,
339,338,321, 244,321,338,337,320, 245,320,337,336,319, 246,319,336,335
,318, 247,318,335,334,317
9150 DATA 248,317,334,272,316, 249,316,272,271,262, 250,262,271,270,261,
251,261,270,269,260, 252,260,
269,268,259, 253,259,268,267,258, 254,258,267,266,257, 255,257,266,265
,256, 256,256,265,264,255
9200 DATA 257,164,193,194,163
9250 FOR I = 0 TO 39
9300 PRINT " ";
9350 NEXT I
9400 RETURN
9450 FOR I = 0 TO 39
9500 PRINT "--";
9550 NEXT I
9600 RETURN
9650 POKE 34,0: HOME : SPEED= 150: VTAB 7: GOSUB 9450: VTAB 9: HOME 1: PRINT "
NO. OF DATA = 1"
9700 VTAB 11: HTAB 9: PRINT "TOTAL NO. OF DATA = ";D: VTAB 13: HTAB 8: PRINT "1
IS NOT GREATER THAN ";D: VTAB 15
: GOSUB 9450
9750 PRINT : PRINT : PRINT : PRINT : FLASH : HTAB B: PRINT "PRESS ANY KEY TO CO
NTINUE": NORMAL : VTAB PEEK (37)
: HTAB 32: GET N4: SPEED= 255
9800 RETURN

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จุฬาลงกรณ์มหาวิทยาลัย

ภาคผนวก ข (ต่อ)

RUN
 NO. OF DATA = 342
 NO. OF GRIDS = 257
 GIVEN ELEVATION = 275

DO YOU WANT TO CHECK DATA?<Y/N>

Y

NO. OF BEGINNING DATA = 1

NO. OF END DATA = 342

NO.	X(I)	Y(I)	Z(I)
1	1590	1030	282.581
2	1590	1035	282.432
3	1590	1040	282.335
4	1600	1010	282.481
5	1600	1015	283.056
6	1600	1020	282.994
7	1600	1025	282.835
8	1600	1030	282.577
9	1600	1035	282.451
10	1600	1040	282.326
11	1600	1045	282.458
12	1600	1050	282.539
13	1600	1055	282.734
14	1600	1060	282.218
15	1610	1010	282.647
16	1610	1015	282.385
17	1610	1020	282.557
18	1610	1025	282.498
19	1610	1030	282.492
20	1610	1035	282.365
21	1610	1040	282.293
22	1610	1045	282.295
23	1610	1050	282.417
24	1610	1055	282.458
25	1610	1060	282.857
26	1610	1065	282.388
27	1620	1005	281.459
28	1620	1010	281.786
29	1620	1015	282.127
30	1620	1020	282.284
31	1620	1025	282.338
32	1620	1030	282.213
33	1620	1035	282.105
34	1620	1040	282.109
35	1620	1045	281.995
36	1620	1050	281.936
37	1620	1055	281.894
38	1620	1060	281.769
39	1620	1065	281.913
40	1620	1070	282.026
41	1620	1075	282.714
42	1620	1080	282.562
43	1620	1085	282.758
44	1620	1090	282.648

ภาคผนวก ข (ต่อ)

44	1620	1070	282.747
45	1630	1005	282.738
46	1630	1010	282.681
47	1630	1015	281.964
48	1630	1020	282.072
49	1630	1025	282.046
50	1630	1030	282.068
51	1630	1035	282.079
52	1630	1040	282.127
53	1630	1045	281.963
54	1630	1050	281.764
55	1630	1055	281.637
56	1630	1060	281.623
57	1630	1065	281.638
58	1630	1070	281.658
59	1630	1075	281.536
60	1630	1080	281.661
61	1630	1085	281.838
62	1630	1090	282.027
63	1630	1095	282.917
64	1630	1100	283.029
65	1640	1035	281.668
66	1640	1040	281.683
67	1640	1045	281.513
68	1640	1050	281.746
69	1640	1055	281.864
70	1640	1060	281.892
71	1640	1065	281.931
72	1640	1070	281.843
73	1640	1075	281.812
74	1640	1080	281.718
75	1640	1085	281.503
76	1640	1090	281.467
77	1640	1095	281.536
78	1640	1100	281.463
79	1640	1105	281.446
80	1640	1110	281.493
81	1640	1115	281.658
82	1640	1120	281.673
83	1640	1125	281.662
84	1640	1130	281.687
85	1640	1135	281.903
86	1640	1140	282.407
87	1640	1145	282.896
88	1640	1150	282.693
89	1650	1035	281.531
90	1650	1040	281.503
91	1650	1045	281.389
92	1650	1050	281.683
93	1650	1055	281.694
94	1650	1060	281.732
95	1650	1065	281.687
96	1650	1070	281.553
97	1650	1075	281.432
98	1650	1080	281.356
99	1650	1085	281.294
100	1650	1090	281.314
101	1650	1095	281.302
102	1650	1100	281.346
103	1650	1105	281.425
104	1650	1110	281.467
105	1650	1115	281.493
106	1650	1120	281.473
107	1650	1125	281.432
108	1650	1130	281.516
109	1650	1135	281.496

ภาคผนวก ข (ต่อ)

110	1650	1140	281.609
111	1650	1145	281.802
112	1650	1150	282.405
113	1650	1155	282.753
114	1650	1160	282.791
115	1660	1030	281.256
116	1660	1040	281.221
117	1660	1045	281.178
118	1660	1050	281.255
119	1660	1055	281.192
120	1660	1060	281.285
121	1660	1065	281.387
122	1660	1070	281.402
123	1660	1075	281.335
124	1660	1080	281.322
125	1660	1085	281.263
126	1660	1090	281.245
127	1660	1095	281.324
128	1660	1100	281.314
129	1660	1105	281.325
130	1660	1110	281.304
131	1660	1115	281.507
132	1660	1120	281.197
133	1660	1125	281.226
134	1660	1130	281.305
135	1660	1135	281.382
136	1660	1140	281.512
137	1660	1145	281.605
138	1660	1150	281.673
139	1660	1155	281.804
140	1660	1160	282.773
141	1660	1165	282.935
142	1670	1030	281.213
143	1670	1035	281.026
144	1670	1040	280.816
145	1670	1045	280.906
146	1670	1050	281.025
147	1670	1055	281.023
148	1670	1060	281.163
149	1670	1065	281.177
150	1670	1070	281.113
151	1670	1075	281.073
152	1670	1080	281.097
153	1670	1085	281.058
154	1670	1090	281.022
155	1670	1095	281.084
156	1670	1100	281.155
157	1670	1105	281.173
158	1670	1110	281.136
159	1670	1115	281.091
160	1670	1120	281.068
161	1670	1125	281.045
162	1670	1130	281.162
163	1670	1135	281.192
164	1670	1140	281.271
165	1670	1145	281.441
166	1670	1150	281.506
167	1670	1155	281.493
168	1670	1160	281.663
169	1670	1165	281.716
170	1670	1170	281.775
171	1670	1175	283.014
172	1670	1180	282.889
173	1670	1185	282.79
174	1680	1035	280.472
175	1680	1040	280.635

ภาคผนวก ข (ต่อ)

170	1680	1045	280.755
177	1680	1050	280.956
178	1680	1055	280.967
179	1680	1060	281.063
180	1680	1065	281.077
181	1680	1070	281.056
182	1680	1075	280.935
183	1680	1080	280.881
184	1680	1085	280.874
185	1680	1090	280.908
186	1680	1095	280.876
187	1680	1100	280.946
188	1680	1105	280.992
189	1680	1110	280.995
190	1680	1115	280.993
191	1680	1120	280.924
192	1680	1125	280.943
193	1680	1130	280.974
194	1680	1135	281.132
195	1680	1140	281.322
196	1680	1145	281.402
197	1680	1150	281.516
198	1680	1155	281.596
199	1680	1160	281.659
200	1680	1165	281.671
201	1680	1170	281.673
202	1680	1175	281.712
203	1680	1180	281.678
204	1680	1185	281.962
205	1690	1095	280.902
208	1690	1100	280.846
207	1690	1105	280.843
208	1690	1110	281.883
209	1690	1115	280.879
210	1690	1120	280.884
211	1690	1125	280.902
212	1690	1130	280.923
213	1690	1135	280.976
214	1690	1140	281.002
215	1690	1145	281.085
216	1690	1150	281.395
217	1690	1155	281.567
218	1690	1160	281.606
219	1690	1165	281.234
220	1690	1170	281.671
221	1690	1175	281.752
222	1690	1180	281.756
223	1690	1185	281.804
224	1690	1190	281.812
225	1700	1095	281.054
226	1700	1100	280.973
227	1700	1105	280.893
228	1700	1110	280.842
229	1700	1115	280.812
230	1700	1120	280.849
231	1700	1125	280.883
232	1700	1130	280.895
233	1700	1135	280.912
234	1700	1140	280.974
235	1700	1145	281.012
236	1700	1150	281.294
237	1700	1155	281.527
238	1700	1160	281.556
239	1700	1165	281.624
240	1700	1170	281.662
241	1700	1175	281.723
242	1700	1180	281.785

ภาคผนวก ข (ต่อ)

242	1700	1180	281.770
243	1700	1185	281.993
244	1710	1095	280.819
245	1710	1100	281.012
246	1710	1105	280.943
247	1710	1110	280.892
248	1710	1115	280.843
249	1710	1120	280.854
250	1710	1125	280.783
251	1710	1130	280.772
252	1710	1135	280.81
253	1710	1140	280.843
254	1710	1145	280.843
255	1710	1150	280.951
256	1710	1155	281.192
257	1710	1160	281.394
258	1710	1165	281.456
259	1710	1170	281.512
260	1710	1175	281.586
261	1710	1180	281.572
262	1710	1185	281.985
263	1720	1145	281.347
264	1720	1150	280.782
265	1720	1155	281.054
266	1720	1160	281.227
267	1720	1165	281.293
268	1720	1170	281.324
269	1720	1175	281.358
270	1720	1180	281.405
271	1720	1185	281.093
272	1720	1190	281.472
273	1730	1160	281.083
274	1730	1165	281.093
275	1730	1170	282.334
276	1680	1185	281.523
277	1680	1190	281.493
278	1680	1195	281.504
279	1680	1200	281.534
280	1680	1205	281.712
281	1680	1210	281.812
282	1680	1215	281.776
283	1680	1220	281.642
284	1680	1225	281.662
285	1680	1230	281.304
286	1680	1235	281.615
287	1690	1185	281.723
288	1690	1190	281.596
289	1690	1195	281.588
290	1690	1200	281.463
291	1690	1205	281.367
292	1690	1210	281.528
293	1690	1215	281.654
294	1690	1220	281.679
295	1690	1225	281.692
296	1690	1230	281.699
297	1690	1235	281.738
298	1690	1240	281.694
299	1690	1245	281.742
300	1700	1185	281.374
301	1700	1190	281.378
302	1700	1195	281.337
303	1700	1200	281.391
304	1700	1205	281.385
305	1700	1210	281.396
306	1700	1215	281.372
307	1700	1220	281.462
308	1700	1225	281.376

ภาคผนวก ข (ต่อ)

308	1700	1225	281.277
309	1700	1230	280.898
310	1700	1235	280.983
311	1700	1240	280.921
312	1700	1245	280.951
313	1700	1250	280.386
314	1700	1255	280.047
315	1710	1185	281.507
316	1710	1190	281.379
317	1710	1195	281.368
318	1710	1200	281.385
319	1710	1205	281.304
320	1710	1210	281.237
321	1710	1215	281.783
322	1710	1220	281.274
323	1710	1225	281.283
324	1710	1230	281.125
325	1710	1235	281.104
326	1710	1240	280.852
327	1710	1245	280.77
328	1710	1250	280.893
329	1710	1255	281.164
330	1710	1260	281.544
331	1710	1265	281.648
332	1720	1185	281.183
333	1720	1190	281.163
334	1720	1195	281.174
335	1720	1200	281.093
336	1720	1205	281.177
337	1720	1210	281.105
338	1720	1215	281.125
339	1720	1220	281.127
340	1720	1225	281.062
341	1720	1230	280.916
342	1720	1235	280.741

DO YOU WANT TO CHECK AGAIN?<Y/N>

N

ANY CORRECTION<Y/N>

N

THE PROGRAM IS RUNNING NOW **

TOTAL AREA OF 257 GRIDS = 12632

TOTAL VOLUME OF 257 GRIDS = 83689.288

ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

DO YOU WANT TO RUN AGAIN?<Y/N>

ภาคผนวก ข (ต่อ)

POKE 1657,120

LIST

```

100 HOME
200 READ G,D
300 DIM X(D + 10),Y(D + 10),Z(D + 10)
400 FOR N = 1 TO D
500 READ A,X(N),Y(N),Z(N)
600 NEXT N
700 READ I
800 INVERSE : VTAB 7: SPEED= 150: GOSUB 15000: NORMAL
900 VTAB 10: HTAB 13: PRINT "NO. OF DATA = ";D
1000 VTAB 12: HTAB 11: PRINT "NO. OF TRIANGLES = ";I
1100 VTAB 14: HTAB 11: PRINT "GIVEN ELEVATION = ";G
1200 INVERSE : VTAB 17: GOSUB 15000: NORMAL : PRINT : PRINT : PRINT : PRINT
1300 SPEED= 150: HTAB 4: PRINT "DO YOU WANT TO CHECK DATA?<Y/N>": VTAB PEEK (3
7): HTAB 35: INPUT " ";N#: SPEED=
255: PRINT : PRINT
1400 IF N# = "Y" THEN 1600
1500 GOTO 3800
1600 HOME : INPUT "NO. OF BEGINNING DATA = ";C: PRINT
1700 INPUT "NO. OF END DATA = ";E: PRINT
1800 IF C < 1 OR C > D THEN 2200
1900 IF E < 1 OR E > D THEN 2200
2000 IF C > E THEN 2200
2100 GOTO 2800
2200 HOME : SPEED= 150: VTAB 6: GOSUB 15400: VTAB 8: HTAB 8: PRINT "NO. OF BEGI
NNING DATA = C": PRINT
2300 HTAB 11: PRINT "NO. OF END DATA = E": PRINT
2400 HTAB 5: PRINT "(C) AND (E) ARE BETWEEN 1 TO";" ";D: PRINT
2500 HTAB 11: PRINT "E IS GREATER THAN C": PRINT : GOSUB 15400
2600 FLASH : VTAB 21: HTAB 8: PRINT "PRESS ANY KEY TO CONTINUE": NORMAL : VTAB
PEEK (37): HTAB 32: GET N#: SPEED=
255:
2700 GOTO 1600
2800 INVERSE : GOSUB 15000: NORMAL
2900 INVERSE : PRINT TAB( 3)"NO.": SPACE( 5);"X(1)": SPACE( 6);"Y(1)": SPACE( 6);"Z(
1)
": NORMAL
3000 VTAB 7: HTAB 4 : GOSUB 15000: NORMAL : PRINT : PRINT : PRINT : PRINT
3100 FOR J = 1 TO I
3200 HTAB 3: PRINT J: HTAB 11: PRINT X(J): HTAB 21: PRINT Y(J): HTAB 31: PRIN
T Z(J)
3300 IF PEEK (37) = 1 THEN VTAB (PEEK (37) + 1): HTAB 17: GET M#: GOTO : VTA
B 9
3400 NEXT J
3500 SPEED= 150: VTAB 23: HTAB 3: PRINT "DO YOU WANT TO CHECK DATA?<Y/N>": VTA
B PEEK (37): HTAB 35: INPUT " ";
M#
3600 SPEED= 255: GOTO 3400
3700 IF M# = "Y" THEN 1600
3800 HOME : SPEED= 150: VTAB 11: HTAB 9: PRINT "**ANY CORRECTION?<Y/N>": VTAB
11: HTAB 32: INPUT " ";:74: SPEED=
255:
3900 IF M# = "Y" THEN 4100
4000 GOTO 3600

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ภาคผนวก ข (ต่อ)

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4100 HOME : SPEED= 150
4200 VTAB 9: HTAB 6: PRINT "PRESS [1] TO CORRECT X(I)"
4300 VTAB 12: HTAB 8: PRINT "PRESS [2] TO CORRECT Y(I)"
4400 VTAB 15: HTAB 8: PRINT "PRESS [3] TO CORRECT Z(I)": PRINT : PRINT : PRINT
: PRINT
4500 HTAB 9: PRINT "WHICH IS YOU CHOICE?": VTAB PEEK (37): HTAB 29: INPUT " ";
I : PRINT
4600 HOME : GOTO 4100
4700 IF K < 1 OR K > 3 THEN 4100
4800 IF I = 1 THEN 5000
4900 GOTO 6100
5000 HOME : SPEED= 150: HTAB 13: PRINT "CORRECTION X(I)"
5100 HTAB 13: PRINT "-----": PRINT
5200 HTAB 3: PRINT "DO NOT ANY MORE<PRESS NO. OF DATA=0>": PRINT
5300 INVERSE : SPEED= 255: GOSUB 15000
5400 PRINT TAB( 3)"NO. OF DATA"; SPC( 4);"OLD DATA"; SPC( 4);"NEW DATA "
5500 VTAB 8: GOSUB 15000: NORMAL : PRINT : POKE 34,9
5600 HTAB 6: INPUT " ";I
5700 IF I = 0 THEN POKE 34,0: GOTO 3900
5800 IF I > 0 THEN GOSUB 15800: GOTO 5000
5900 VTAB PEEK (37): HTAB 18: PRINT X(I): VTAB PEEK (37): HTAB 29: INPUT " ";
X(I): PRINT
6000 GOTO 5600
6100 IF K = 2 THEN 6300
6200 GOTO 7400
6300 HOME : SPEED= 150: HTAB 13: PRINT "CORRECTION Y(I)"
6400 HTAB 13: PRINT "-----": PRINT
6500 HTAB 3: PRINT "DO NOT ANY MORE<PRESS NO. OF DATA=0>": PRINT
6600 INVERSE : SPEED= 255: GOSUB 15000
6700 PRINT TAB( 3)"NO. OF DATA"; SPC( 4);"OLD DATA"; SPC( 4);"NEW DATA "
6800 VTAB 8: GOSUB 15000: NORMAL : PRINT : POKE 34,9
6900 HTAB 6: INPUT " ";I
7000 IF I = 0 THEN POKE 34,0: GOTO 3900
7100 IF I > 0 THEN GOSUB 15800: GOTO 6300
7200 VTAB PEEK (37): HTAB 18: PRINT Y(I): VTAB PEEK (37): HTAB 29: INPUT " ";
Y(I): PRINT
7300 GOTO 6900
7400 IF K = 3 THEN 7500
7500 HOME : SPEED= 150: HTAB 13: PRINT "CORRECTION Z(I)"
7600 HTAB 13: PRINT "-----": PRINT
7700 HTAB 3: PRINT "DO NOT ANY MORE<PRESS NO. OF DATA=0>": PRINT
7800 INVERSE : SPEED= 255: GOSUB 15000
7900 PRINT TAB( 3)"NO. OF DATA"; SPC( 4);"OLD DATA"; SPC( 4);"NEW DATA "
8000 VTAB 8: GOSUB 15000: NORMAL : PRINT : POKE 34,9
8100 HTAB 6: INPUT " ";I
8200 IF I = 0 THEN POKE 34,0: GOTO 3900
8300 IF I > 0 THEN GOSUB 15800: GOTO 7500
8400 VTAB PEEK (37): HTAB 18: PRINT Z(I): VTAB PEEK (37): HTAB 29: INPUT " ";
Z(I): PRINT
8500 GOTO 8100
8600 HOME : VTAB 12: HTAB 6: FLASH : SPEED= 150: PRINT "THE PROGRAM IS FINISHING
NOW !": SPEED= 255: NORMAL
8700 SUM = 0: ZZZ = 0
8800 FOR M = 1 TO 1
8900 READ B,I,J,K
9000 F1 = Y(I) * X(J)
9100 F2 = Y(J) * X(K)
9200 F3 = Y(K) * X(I)
9300 F4 = X(I) * Y(J)
9400 F5 = X(J) * Y(K)
9500 F6 = X(K) * Y(I)
9600 AREA = 1 / 2 * (F1 + F2 + F3 - F4 - F5 - F6)
9700 H = 1 / 3 * (Z(I) + Z(J) + Z(K)) - B
9750 AREA = ABS (AREA): ZZZ = ZZZ + AREA
9800 V = AREA * H
9900 V = ABS (V)

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ภาคผนวก ข (ต่อ)

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10000 SUM = SUM + V
10100 NEXT M
10200 HOME : VTAB 6: INVERSE : SPEED= 150: GOSUB 15000: NORMAL
10300 SUM = INT (1000 * SUM + 0.5) / 1000
10325 ZZZ = INT (1000 * ZZZ + 0.5) / 1000
10350 VTAB 9: PRINT "TOTAL AREA OF ";I;" TRIANGLES = ";ZZZ
10400 VTAB 12: PRINT "TOTAL VOLUME OF ";I;" TRIANGLES = ";SUM
10500 INVERSE : VTAB 15: GOSUB 15000: NORMAL : PRINT : PRINT : PRINT : PRINT :
PRINT
10600 HTAB 5: PRINT "DO YOU WANT TO RUN AGAIN?<Y/N>": VTAB PEEK (37): HTAB 35:
INPUT " ";Y#: SPEED= 255
10700 IF Y# = "Y" THEN RUN
10800 PRINT CHR# (4);"RUN EARTH VOLUME"
10900 END
11000 DATA      275,145, 1,1600.000,1010.000,282.411 ,2,1604.514,1010.000,282
.532, 3,1600.000,1015.504,283.10
4, 4,1600.000,1020.612,282.293, 5,1612.721,1010.000,282.601, 6,1620.000,1
010.000,282.840, 7,1620.000,1005
.000,281.476
11100 DATA      8,1630.000,1005.000,282.714, 9,1617.095,1015.343,282.177, 10
,1610.312,1020.471,282.517, 11,1
600.000,1027.500,282.500, 12,1610.513,1034.545,282.297, 13,1620.475,1023.5
16,282.286, 14,1630.786,1012.506
,281.991
11200 DATA      15,1630.000,1024.214,281.976, 16,1623.316,1033.278,282.191, 1
7,1613.567,1045.438,282.215, 18,
1609.420,1050.649,282.497, 19,1618.225,1050.717,282.011, 20,1630.000,1034.
000,282.075, 21,1704.980,1233.40
0,280.914
11300 DATA      22,1639.474,1035.527,282.589,23,1630.558,1047.517,281.696,24,1618.
640,1065.444,281.851,25,1610.000,
1065.000,282.410,26,1610.000,1060.000,282.790,27,1620.000,1065.000,281.930
11400 DATA      28,1634.158,1064.243,281.441, 29,1644.616,1042.500,281.423
11500 DATA      30,1647.129,1035.000,281.660, 31,1665.795,1035.000,281.276
, 32,1658.556,1043.572,281.101,
33,1646.513,1058.537,281.784, 34,1643.248,1072.471,281.766, 35,1665.440,1
061.573,281.346, 36,1680.000,105
4.518,281.020
11600 DATA      37,1656.674,1056.000,281.101, 38,1670.728,1043.516,280.969, 39,
1680.000,1035.000,280.522, 40,168
0.000,1064.319,280.977, 41,1660.361,1073.493,281.372, 42,1657.147,1083.573
,281.412, 43,1620.000,1090.000,2
82.901
11700 DATA      44,1630.000,1090.000,282.107, 45,1630.475,1075.104,282.107, 46,
1635.522,1092.663,282.693, 47,165
0.614,1087.506,281.370, 48,1670.718,1081.556,281.113, 49,1680.000,1
80.951, 50,1680.516,1087.919,280.
912
11800 DATA      51,1673.691,1100.723,281.416, 52,1660.634,1100.561,281.300, 53,1
677.500,1100.432,280.971, 54,1690
.000,1095.000,280.876, 55,1680.000,1095.000,280.814, 56,1701.514,1097.296,28
0.991, 57,1678.913,1111.515,280.
952
11900 DATA      58,1669.525,1120.568,281.263, 59,1670.000,1110.504,281.025, 60,1
690.113,1103.548,280.799, 61,1710
.000,1095.000,281.786, 62,1710.000,1106.507,280.853, 63,1701.535,1105.711,28
0.842, 64,1683.322,1118.346,280.8
21
12000 DATA      65,1676.483,1125.264,280.959, 66,1690.575,1117.525,280.795, 67,1
700.112,1115.495,280.746, 68,1710
.134,1111.227,280.813, 69,1710.000,1126.125,280.690, 70,1695.250,1130.587,2
80.869, 71,1680.862,1134.477,281
.049
12100 DATA      72,1640.000,1150.000,282.665, 73,1650.000,1150.000,282.474, 74,
1690.225,1139.268,282.776, 75,17
00.311,1135.500,280.913, 76,1710.176,1132.471,280.712, 77,1710.155,1137.575,

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ภาคผนวก ข (ต่อ)

1200	DATA	78,1666.507,1150.245,201.441
12200	DATA	79,1710.000,1145.000,200.862, 80,1720.000,1145.000,201.240, 81,1700.145,1151.534,201.529, 82,1650.000,1160.000,202.713, 83,1660.000,1160.000,202.830, 84,1660.000,1165.000,202.700, 85,1670.000,1165.000,201.67
12300	DATA	86,1670.000,1173.545,202.906, 87,1680.195,1168.169,201.595, 88,1710.322,1152.541,201.274, 89,1720.452,1147.573,201.298, 90,1720.000,1159.508,201.139, 91,1700.233,1169.146,201.581, 92,1685.294,1176.560,201.635
12400	DATA	93,1690.372,1180.544,201.673, 94,1700.486,1176.176,201.759, 95,1715.596,1170.339,201.453, 96,1720.000,1172.293,201.258, 97,1705.196,1180.916,201.711, 98,1695.513,1185.547,201.744, 99,1700.772,1192.531,201.276
12500	DATA	100,1710.825,1187.536,201.912, 101,1720.000,1193.665,201.747, 102,1720.000,1190.161,201.413, 103,1710.577,1197.438,201.288, 104,1720.000,1197.434,201.092, 105,1720.000,1219.128,201.094, 106,1720.000,1235.000,200.694
12600	DATA	107,1630.000,1235.000,201.563, 108,1680.336,1226.217,201.599, 109,1680.000,1220.523,201.571, 110,1680.000,1215.674,201.793, 111,1680.000,1185.000,201.491, 112,1710.315,1098.537,201.111, 113,1630.000,1100.000,201.959
12700	DATA	114,1640.000,1100.000,201.427, 115,1640.000,1131.415,201.592, 116,1610.000,1010.000,202.264, 117,1602.717,1043.039,202.377, 118,1600.000,1060.000,202.271, 119,1631.662,1078.225,201.583, 120,1646.851,1111.558,201.336
12800	DATA	121,1640.000,1107.000,201.442, 122,1651.623,1126.464,201.396, 123,1655.442,1130.665,201.204, 124,1665.475,1129.184,201.071, 125,1675.621,1144.036,201.352, 126,1670.272,1136.985,201.124, 127,1658.021,1147.067,201.751
12900	DATA	128,1633.595,1140.296,202.214, 129,1682.143,1158.040,201.493, 130,1666.263,1160.587,201.486, 131,1670.000,1185.000,202.836, 132,1687.145,1190.438,201.398, 133,1708.543,1217.544,201.270, 134,1709.953,1207.817,201.129
13000	DATA	135,1706.171,1205.653,201.146, 136,1693.683,1209.657,201.172, 137,1690.416,1204.838,201.224, 138,1683.119,1201.985,201.352, 139,1691.496,1215.256,201.565, 140,1677.032,1213.224,201.279, 141,1718.661,1219.354,201.044
13100	DATA	142,1711.155,1226.118,201.147, 143,1704.673,1220.135,201.156, 144,1687.552,1226.438,201.499, 145,1694.065,1234.573,201.673
13200	DATA	195, 1,1,10,116, 2,116,10,6, 3,7,6,8, 4,6,8,15, 5,10,6,13, 6,6,13,15, 7,1,10,11, 8,11,10,12, 9,10,12,13, 10,12,13,16, 11,13,16,15, 12,15,18,20, 13,11,117,118, 14,11,12,117, 15,117,12,18
13300	DATA	16,17,18,19, 17,12,19,16, 18,16,19,20, 19,19,20,21, 20,20,29, 21,20,29,30, 22,29,30, 23,23,30,31, 24,31,32,38, 25,31,38,39, 26,38,39,36, 27,36,38,35, 28,35,36,40, 29,37,38,35
13400	DATA	30,32,37,38, 31,29,32,37, 32,29,33,37, 33,23,29,33, 34,23,33,28, 35,23,27,28, 36,19,23,27, 37,26,19,27, 38,18,19,26, 39,18,26,118, 40,117,18,118, 41,25,26,27, 42,27,43,119, 43,27,28,119
13500	DATA	44,28,119,34,45,28,33,34,46,33,34,41,47,33,33,41,48,33,33,42,49,40,

ภาคผนวก ข (ต่อ)

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35,41,50,40,41,49,51,48,49,55,52,
  41,48,49,53,41,47,48,54,34,41,47,55,34,46,47,56,34,46,119,57,119,44,46,58,11
9,43,44
13600 DATA 59,44,46,113,60,46,113,114,61,46,47,114,62,47,51,114,63,47,48,51,64,
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2,67,69
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,59,80,52,58,120,81,51,52,120,82,
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13800 DATA 88,58,123,124,89,58,59,124,90,124,59,71,91,59,64,71,92,57,56,64,93,6
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14000 DATA 103,126,78,125,104,124,126,71,105,127,78,126,106,128,127,127,107,128
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27,83,115,73,82,83
14100 DATA 116,83,127,78, 117,78,130,129, 118,125,78,129, 119,125,12
9,74, 120,74,127,81, 121,74,8
  1,75, 122,75,79,81, 123,79,81,88, 124,79,80,88, 125,80,88,90, 126,
90,95,96
14200 DATA 127,88,90,95,128,88,91,95,129,81,88,91,130,129,81,91,131,129,87,91,1
32,129,87,85,133,130,85,129,134,8
  3,84,130,135,130,84,85,136,85,86,87,137,86,87,92,138,87,91,92,139,91,92,140
40,91,94,97
14300 DATA 141,91,97,95,142,95,96,97,143,96,97,101,144,100,101,102,145,97,100,
101,146,97,98,100,147,94,97,98,14
  8,93,94,98,149,92,93,94,150,92,93,111,151,131,111,92,152,131,86,92,153,111,9
3,132
14400 DATA 154,132,93,98
14500 DATA 155,98,99,100,156,99,100,103,157,100,102,103,158,102,104,103,159,10
4,105,141,160,134,141,104,161,103
  104,134,162,134,135,103,163,135,99,103,164,136,135,99,165,136,99,167,166,13
2,99,93
14600 DATA 167,132,137,99
14700 DATA 168,132,138,137, 169,111,138,132, 170,111,138,110, 171,138
,137,110, 172,137,110,139, 17
  3,137,139,136, 174,136,139,140, 175,136,140,135, 176,136,140,135, 17
7,135,133,134, 178,134,133,141,
  179,141,105,106
14800 DATA 180,141,106,142,181,142,141,133,182,142,133,143,183,180, 181,143,180,
129,140,143,185,110,107,139,186,1
  09,139,144,187,184,139,143,188,144,143,145,189,145,71,143,190,147,143,144,191
,21,142,106
14900 DATA 192,145,21,106, 193,145,107,144, 194,107,109,144, 195,105,
150,70
15000 FOR I = 0 TO 37
15100 PRINT " ";
15200 NEXT I
15300 RETURN
15400 FOR I = 0 TO 37
15500 PRINT "--";
15600 NEXT I
15700 RETURN
15800 PULSE 34,0: HOME : SPEED= 150: VIAB 7: GUSUB 15600: VIAB 8: GOTO 15900
"END OF DATA = 1"
15900 VIAB 11: HOME 7: PRINT "TOTAL NO. OF DATA = ";DI: VIAB 12: GOTO 15800
I IS NOT GREATER HOME ";DI: VIAB 1
  7: GOSUB 15400
16000 PRINT : PRINT : PRINT : PRINT : FLASH : HOME 0: PRINT "HOLD ON TO THE
ONLINE": NORMAL : VIAB PEEK (37
  1): VIAB 32: GET N1: SPEED= 255
16100 RETURN

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ภาคผนวก ข (ต่อ)

P001

NO. OF DATA = 145
 NO. OF RELEVATIONS = 125
 GIVEN ELEVATION = 275

DO YOU WANT TO CHECK DATA? (Y/N)

Y

NO. OF BEGINNING DATA = 1

NO. OF END DATA = 145

NO.	X (D)	Y (D)	Z (D)
1	1600	1010	281.411
2	1601.514	1010	281.411
3	1600	1015.504	281.168
4	1600	1020.612	282.293
5	1612.721	1010	282.601
6	1620	1010	282.84
7	1620	1005	281.475
8	1630	1005	282.714
9	1617.095	1015.343	282.177
10	1610.312	1020.471	282.517
11	1600	1027.5	282.5
12	1610.513	1034.545	282.297
13	1620.475	1023.516	282.286
14	1630.786	1012.506	281.991
15	1630	1024.214	281.976
16	1623.316	1033.278	282.141
17	1613.567	1045.438	282.215
18	1609.42	1050.649	282.497
19	1618.225	1050.717	282.011
20	1630	1054	282.025
21	1704.98	1233.4	280.914
22	1639.474	1035.527	282.589
23	1630.558	1047.517	281.696
24	1618.64	1065.444	281.851
25	1610	1065	282.41
26	1610	1050	282.79
27	1620	1065	281.93
28	1634.158	1064.243	281.441
29	1644.616	1042.5	281.423
30	1647.129	1035	281.66
31	1665.795	1035	281.276
32	1658.556	1043.572	281.101
33	1646.513	1058.537	281.784
34	1643.248	1072.471	281.766
35	1655.44	1061.573	281.346
36	1680	1054.518	281.02
37	1656.674	1055	281.101
38	1670.728	1043.516	280.969
39	1680	1035	280.522
40	1680	1064.319	280.977

ภาคผนวก ข (ต่อ)

41	1660.361	1073.493	281.372
42	1637.547	1083.573	281.412
43	1620	1090	282.901
44	1630	1090	282.107
45	1630.475	1093.524	282.361
46	1635.522	1092.663	282.693
47	1650.614	1087.506	281.371
48	1670.718	1081.556	281.113
49	1630	1078.275	280.951
50	1680.516	1087.919	280.912
51	1653.691	1100.723	281.416
52	1660.634	1106.364	281.39
53	1677.5	1100.432	280.991
54	1690	1095	280.956
55	1680	1095	280.814
56	1701.514	1099.296	280.981
57	1678.913	1111.545	280.952
58	1660.525	1120.568	281.263
59	1670	1118.545	281.025
60	1690.113	1108.548	280.799
61	1710	1095	281.786
62	1710	1106.507	280.853
63	1701.536	1110.29	280.847
64	1683.322	1118.346	280.821
65	1675.483	1125.264	280.959
66	1690.575	1119.328	280.792
67	1700.112	1115.495	280.746
68	1710.134	1111.227	280.813
69	1710	1126.125	280.698
70	1695.25	1130.587	280.869
71	1680.362	1134.477	281.042
72	1640	1150	282.665
73	1650	1150	282.474
74	1690.225	1139.268	282.976
75	1700.311	1135.5	280.913
76	1710.176	1132.491	280.712
77	1710.155	1137.575	280.734
78	1666.507	1150.246	281.441
79	1710	1145	280.862
80	1720	1145	281.24
81	1700.146	1151.554	281.329
82	1650	1160	282.713
83	1660	1160	282.83
84	1660	1165	282.98
85	1670	1165	281.671
86	1670	1173.545	282.966
87	1630.193	1163.169	281.595
88	1710.322	1152.591	281.274
89	1720.452	1147.573	281.293
90	1720	1159.508	281.139
91	1700.233	1159.146	281.581
92	1685.294	1176.56	281.635
93	1690.372	1180.594	281.673
94	1700.486	1176.176	281.709
95	1715.596	1170.339	281.453
96	1720	1175.963	281.341
97	1705.196	1180.916	281.711
98	1695.513	1185.547	281.744
99	1700.772	1192.531	281.276
100	1710.823	1187.536	281.912
101	1720	1182.665	281.427
102	1720	1190.161	281.413
103	1710.577	1197.438	281.288
104	1720	1197.434	281.092
105	1720	1219.128	281.094
106	1720	1235	280.694

ภาคผนวก ข

107	1680	1235	281.363
108	1680.336	1226.217	281.599
109	1680	1240.523	281.571
110	1680	1245.674	281.793
111	1680	1185	281.491
112	1710.315	1098.537	281.111
113	1630	1100	281.939
114	1640	1100	281.427
115	1640	1131.415	281.592
116	1610	1010	282.264
117	1602.717	1043.039	282.377
118	1600	1060	282.271
119	1631.662	1078.225	281.583
120	1646.851	1111.558	281.336
121	1640	1107	281.442
122	1651.623	1126.464	281.396
123	1656.442	1130.665	281.204
124	1665.473	1129.184	281.071
125	1675.621	1144.036	281.352
126	1670.272	1136.965	281.124
127	1658.021	1147.067	281.751
128	1653.595	1140.296	282.214
129	1682.143	1133.04	281.493
130	1666.983	1160.507	281.486
131	1670	1185	282.836
132	1687.145	1190.438	281.398
133	1708.543	1217.544	281.37
134	1709.953	1207.817	281.129
135	1706.171	1205.653	281.146
136	1693.683	1209.657	281.372
137	1690.416	1204.838	281.224
138	1683.119	1201.985	281.562
139	1691.496	1216.256	281.565
140	1698.932	1213.224	281.279
141	1718.661	1219.354	281.044
142	1711.155	1226.118	281.147
143	1704.673	1220.135	281.338
144	1687.332	1226.438	281.499
145	1694.063	1234.573	281.673

DO YOU WANT TO CORRECT (Y/N) >

N

*WANT CORRECTION (Y/N) >

N

THE PROGRAM IS FINISHING NOW**

TOTAL AREA OF 195 TABLETS = 1,859,625

TOTAL VOLUME OF 195 TABLETS = 6,349,933

จุฬาลงกรณ์มหาวิทยาลัย

DO YOU WANT TO RUN AGAIN (Y/N) >



ภาคผนวก ค

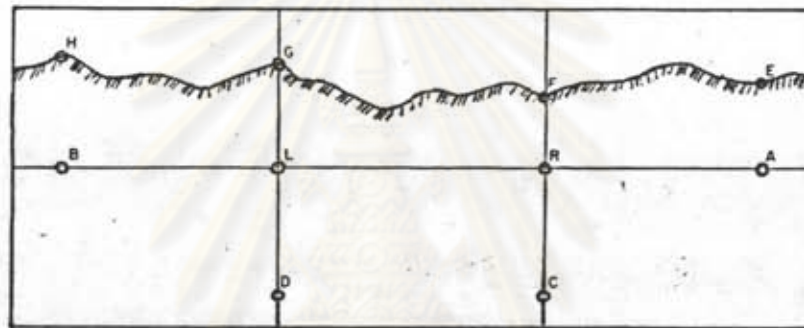
การจัดภาพสัมพัทธ์ในงานสำรวจด้วยภาพถ่ายภาคพื้นดิน

ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

ภาคผนวก ค

การจัดภาพสัมพันธ์ในงานสำรวจด้วยภาพถ่ายภาคพื้นดิน โดย F.J. Montero

ในงานสำรวจด้วยภาพถ่ายภาคพื้นดิน รูปจำลองสามมิติส่วนมากจะเป็นลักษณะดังรูปข้างล่าง F.J. Montero at the Ohio State University ได้จัดทำขั้นตอนและหลักการ จัดภาพสัมพันธ์ของรูปจำลองสามมิติ



รูปที่ ค.1 รูปจำลองสามมิติของภูมิประเทศ

ในรูปจำลอง L และ R เป็นจุดमुखสำคัญของภาพถ่ายซ้ายและขวา

A และ B อยู่ที่ขอบตรงข้ามกันของเส้นที่ลากผ่านจุด L และ R

C และ D อยู่ใกล้ฐานถ่ายภาพซึ่งอยู่ด้านล่างของรูปจำลอง

E, F, G, R อยู่ไกลจากฐานถ่ายภาพซึ่งอยู่ด้านบนของรูปจำลอง

มีขั้นตอนการจัดภาพสัมพันธ์ดังนี้

1. ตั้งคันล่ำแสงค้ำซ้ายให้อยู่ในแนวตั้งตรงกับจุด L และขจัดระยะเหลืออมทาง y ด้วย by'
2. ที่จุด B ซึ่งอยู่ทางค้ำซ้ายของรูปจำลองสามมิติ ขจัดระยะเหลืออมทาง y ด้วย K' อ่านค่า $K' = K'_1$
3. ที่จุด A ซึ่งอยู่ทางขวาของรูปจำลองสามมิติ ขจัดระยะเหลืออมทาง y ด้วย K'

อ่านค่า $K' = K'_2$ แล้วตั้งค่า $K' = \frac{K'_1 + K'_2}{2}$

4. กระทำซ้ำตั้งแต่ขั้นตอนที่ 1 ถึงขั้นตอนที่ 3 จนกระทั่งจุดเหล่านี้ไม่มีระยะเหลือมทาง y
5. ที่จุด C ซึ่งอยู่ด้านล่างของรูปจำลองสามมิติ ขจัดระยะเหลือมทาง y ด้วย b'_z
6. ที่จุด F ซึ่งอยู่ด้านบนของรูปจำลองสามมิติ นำจุดลอยไปแตะที่จุดที่สูงที่สุด (จุด F) และขจัดระยะเหลือมทาง y ด้วย ω'
7. กระทำซ้ำตั้งแต่ขั้นตอนที่ 1 ถึงขั้นตอนที่ 6 จนกระทั่งทุกจุดไม่มีระยะเหลือมทาง y
8. ที่บริเวณด้านล่างของรูปจำลองสามมิติ ตรวจสอบระยะเหลือมทาง y ด้วย b'_z
9. ที่จุด E ซึ่งอยู่ด้านบนของรูปจำลองสามมิติ นำจุดลอยไปแตะที่จุดบนสุดและขวาสุด (จุด E) ขจัดระยะเหลือมทาง y ด้วย ϕ' อ่านค่า $\phi' = \phi'_1$
10. นำจุดลอยไปแตะที่จุดบนสุดและซ้ายสุดของรูปจำลองสามมิติ (จุด H) ขจัดระยะเหลือมทาง y ด้วย ϕ' อ่านค่า $\phi' = \phi'_2$ แล้วตั้งค่า $\phi' = \left(\frac{\phi'_1 + \phi'_2}{2}\right)$
11. กระทำซ้ำตั้งแต่ขั้นตอนที่ 1 จนถึงขั้นตอนที่ 10 จนกระทั่งไม่มีระยะเหลือมทาง y ในรูปจำลองสามมิติ

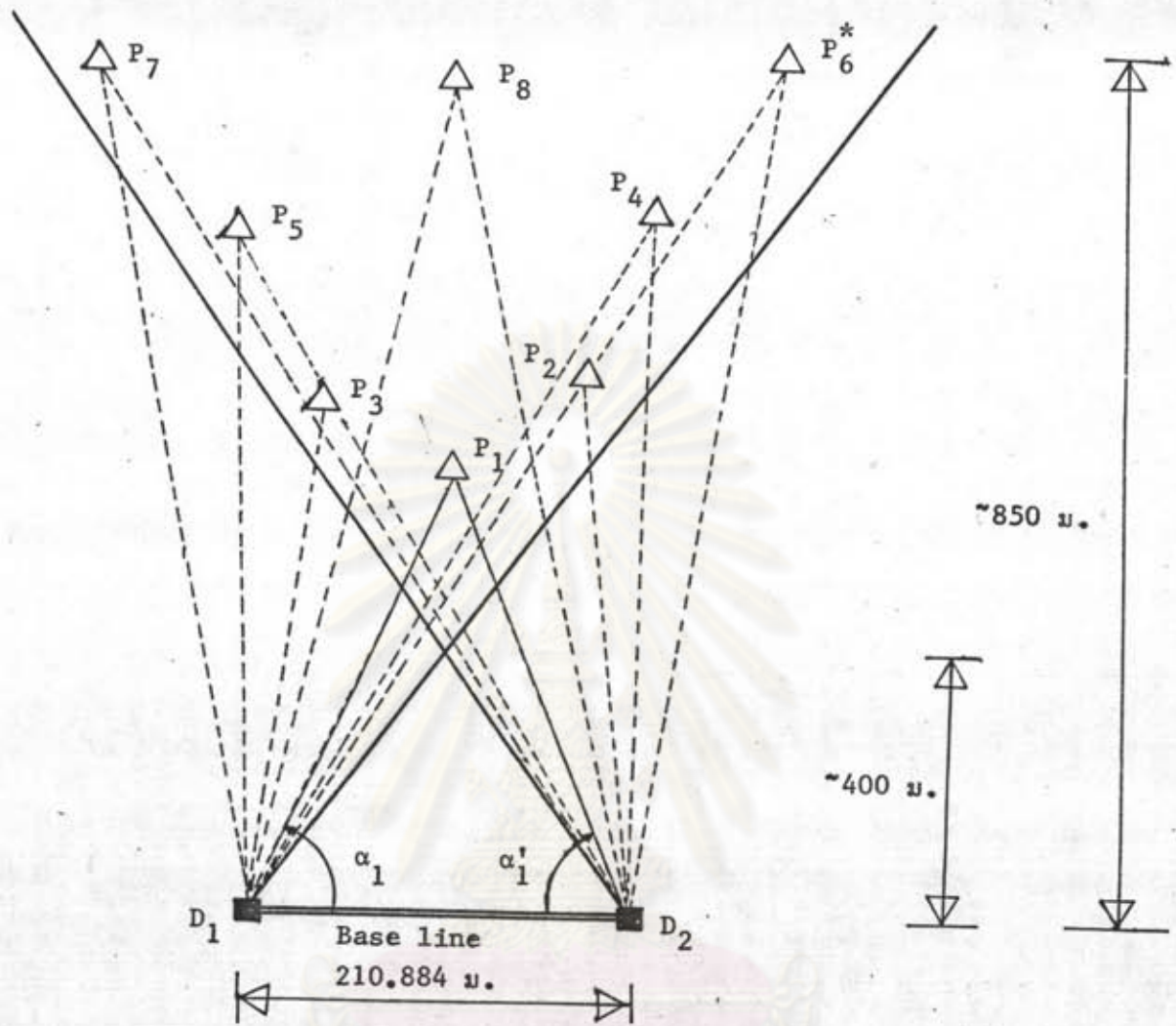
ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย



ภาคผนวก ง

ข้อมูลรั่วจุดควบคุมภาคพื้นดิน

ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย



รูปที่ ง.1 แผนผังงานรังวัดเพื่อหาค่าทิศทางจุดควบคุมทางราบและทางตั้ง

- ⊙ ตำแหน่งของจุดตั้งกล้องถ่ายภาพ
- Δ ตำแหน่งของจุดควบคุมทางราบและทางตั้ง
- แนวการรังวัดมุมเพื่อคำนวณค่าทิศทางทางราบและทางตั้งโดยวิธี เล็งสกัด

ตารางที่ ง.1 ข้อมูลรั้ววัดจุดควบคุมภาคพื้นดิน

Station			Horizontal Circle	Mean Horizontal	Direction
From	To	Face	Reading	Circle Reading	Counter Clockwise
D ₁	D ₂	D	00° 00' 37.6"	180° 00' 41.2"	00° 00' 00.0"
		R	180 00 44.8		
	P ₇	D	258 32 54.3	78 32 58.6	101 27 42.6
		R	78 33 03.0		
	P ₅	D	261 33 16.4	81 33 18.0	98 27 23.2
		R	81 33 19.5		
	P ₃	D	269 14 48.4	89 14 49.8	90 45 51.4
		R	89 14 51.1		
	P ₁	D	278 41 53.2	98 41 54.8	81 18 46.4
		R	98 41 56.3		
	P ₈	D	276 10 53.9	96 10 55.4	83 49 45.8
		R	96 10 56.9		
	P ₆	D	292 58 58.3	112 59 01.4	67 01 39.8
		R	112 59 04.4		
	P ₄	D	294 35 48.8	114 35 51.8	65 24 49.4
		R	114 35 54.7		
	P ₂	D	292 54 18.2	112 54 21.0	67 06 20.2
		R	112 54 23.9		

ตารางที่ ง.1 (ต่อ)

Station			Horizontal Circle	Mean Horizontal	Direction
From	To	Face	Reading	Circle Reading	Counter Clockwise
D ₁	D ₂	D	90°00'17".1	90°00'22".0	0°00'00".0
		R	270 00 26.9		
	P ₇	D	348 32 33.7	348 32 38.3	101 27 43.7
		R	168 32 42.9		
	P ₅	D	351 32 54.8	351 32 58.5	98 27 23.5
		R	171 33 02.2		
	P ₃	D	359 14 31.3	359 14 33.6	90 45 48.4
		R	179 14 35.9		
	P ₁	D	08 41 35.2	08 41 37.4	81 18 44.6
		R	188 41 39.6		
	P ₈	D	06 10 31.0	06 10 33.8	83 49 48.2
		R	186 10 36.6		
	P ₆	D	22 58 41.2	22 58 43.1	67 01 38.9
		R	202 58 45.0		
	P ₄	D	24 35 31.7	24 35 33.9	65 24 48.1
		R	204 35 36.1		
	P ₂	D	22 54 03.9	22 54 05.5	67 06 16.5
		R	202 54 07.1		

ตารางที่ ง.1 (ต่อ)

Station			Horizontal Circle Reading	Mean Horizontal Circle Reading	Direction
From	To	Face			
D ₂	D ₁	D	00°00'00.0	00°00'02.6	00°00'00.0
		R	180 00 05.2		
	P ₇	D	64 18 30.2	64 18 35.6	64 18 33.0
		R	244 18 41.0		
	P ₅	D	64 47 29.2	64 47 34.1	64 47 31.5
		R	244 47 39.0		
	P ₃	D	67 39 28.7	67 39 33.9	67 39 31.3
		R	247 39 39.1		
	P ₁	D	73 56 18.7	73 56 19.5	73 56 16.9
		R	253 56 20.3		
	P ₈	D	81 46 07.0	81 46 08.4	81 46 05.8
		R	261 46 09.8		
	P ₂	D	91 59 01.8	91 59 04.7	91 59 02.2
		R	271 59 07.7		
	P ₄	D	96 48 55.8	96 48 58.6	96 48 56.0
		R	276 49 01.3		
	P ₆	D	99 05 44.0	99 05 44.6	99 05 42.0
		R	279 05 45.1		

ตารางที่ ง.1 (ต่อ)

Station		Face	Horizontal Circle	Mean Horizontal	Direction
From	To		Reading	Circle Reading	
D ₂	D ₁	D	270°00'23.3	90°00'18.3	00°00'00.0
		R	90 00 13.3		
	P ₇	D	334 18 41.2	154 18 44.5	64 18 26.2
		R	154 18 47.9		
	P ₅	D	334 47 43.8	154 47 46.6	64 47 28.4
		R	154 47 49.5		
	P ₃	D	337 39 42.1	157 39 43.4	67 39 25.1
		R	157 39 44.7		
	P ₁	D	343 56 30.6	163 56 31.7	73 56 13.4
		R	163 56 32.9		
	P ₈	D	351 46 17.1	171 46 18.4	81 46 00.2
		R	171 46 19.8		
	P ₂	D	01 59 12.0	181 59 13.4	91 58 55.1
		R	181 59 14.8		
	P ₄	D	06 49 01.0	186 49 05.2	96 48 46.8
		R	186 49 09.3		
	P ₆	D	09 05 52.7	189 05 52.6	99 05 34.3
		R	189 05 52.5		

ตารางที่ ง.1 (ต่อ)

Station		Direction	Mean Direction Counter Clockwise
From	To		
D ₁	D ₂	00°00'00.0	00°00'00.0
	P ₇	101 27 43.7	101 27 43.2
		101 27 42.6	
	P ₅	98 27 23.5	98 27 23.4
		98 27 23.2	
	P ₃	90 45 48.4	90 45 49.9
		90 45 51.4	
	P ₁	81 18 44.5	81 18 45.5
		81 18 46.4	
	P ₈	83 49 48.2	83 49 47.0
		83 49 45.8	
	P ₆	67 01 38.9	67 01 39.4
		67 01 39.8	
	P ₄	65 24 48.1	65 24 48.7
		65 24 49.4	
	P ₂	67 06 16.5	67 06 18.4
67 06 20.2			

ตารางที่ ง.1 (ต่อ)

Station		Direction	Mean Direction
From	To		
D ₂	D ₁	00°00'00.0	0°00'00.0
	P ₇	64 18 26.2	64 18 29.6
		64 18 33.0	
	P ₅	64 47 28.4	64 47 29.9
		64 47 31.5	
	P ₃	67 39 25.1	67 39 28.2
		67 39 31.3	
	P ₁	73 56 13.4	73 56 15.2
		73 56 16.9	
	P ₈	81 46 00.2	81 46 03.0
		81 46 05.8	
	P ₆	99 05 34.3	99 05 38.2
		99 05 42.0	
	P ₄	96 48 46.8	96 48 51.4
96 48 56.0			
P ₂	91 58 55.1	91 58 58.6	
	91 59 02.2		

ตารางที่ ง.1 (ต่อ)

Sattion		Face	Vertical Reading	Vertical Reading
From	To			
D ₂	P ₇	D	90°43'18".1	90°43'18".5
		R	269 16 41.1	
	P ₅	D	92 20 34.8	92 20 34.8
		R	267 39 25.1	
	P ₃	D	94 09 08.7	94 09 10.4
		R	265 50 47.8	
	P ₁	D	94 48 13.2	94 48 15.2
		R	265 11 42.9	
	P ₈	D	90 55 35.9	90 55 36.5
		R	269 04 22.9	
	P ₂	D	94 14 17.0	94 14 18.0
		R	265 45 41.0	
	P ₄	D	92 44 26.7	92 44 28.9
		R	267 15 28.8	
	P ₆	D	90 57 11.1	90 57 13.2
		R	269 02 44.8	

ตารางที่ ง.1 (ต่อ)

Station		Face	Vertical Reading	Mean
From	To			Vertical Reading
D ₂	P ₇	D	90°43'18.1	90°43'19.4
		R	269 16 39.3	
	P ₅	D	92 20 33.9	92 20 34.5
		R	267 39 24.9	
	P ₃	D	94 09 08.3	94 09 10.1
		R	265 50 48.2	
	P ₁	D	94 48 11.0	94 48 14.9
		R	265 11 41.2	
	P ₈	D	90 55 32.3	90 55 34.2
		R	269 04 23.9	
	P ₂	D	94 14 15.2	94 14 19.6
		R	165 45 36.0	
	P ₄	D	92 44 27.1	92 44 27.4
		R	267 15 32.2	
	P ₆	D	90 57 12.5	90 57 13.9
		R	269 02 44.7	

ตารางที่ ง.1 (ต่อ)

Station		Face	Vertical Reading	Mean
From	To			
D ₁	P ₇	D	90°38'00".3	90°38'06".2
		R	269 21 47.8	
	P ₅	D	92 23 31.0	92 23 22.6
		R	267 36 45.8	
	P ₃	D	94 16 13.2	94 16 19.1
		R	265 43 35.1	
	P ₁	D	94 42 07.0	94 42 15.6
		R	265 17 35.7	
	P ₈	D	90 47 28.1	90 47 27.6
		R	269 12 32.8	
	P ₆	D	90 45 21.8	90 45 25.1
		R	269 14 31.7	
	P ₄	D	92 20 25.1	92 20 28.5
		R	267 39 28.1	
	P ₂	D	93 42 43.0	93 42 48.4
		R	266 17 06.1	

ตารางที่ ง.1 (ต่อ)

Station		Face	Vertical Reading	Mean
From	To			
D ₁	P ₇	D	90°38'01.1"	90°38'06.8"
		R	269 21 47.4	
	P ₅	D	92 23 05.0	92 23 10.1
		R	267 36 44.9	
	P ₃	D	94 16 12.3	94 16 18.6
		R	265 43 35.1	
	P ₁	D	94 42 11.2	94 42 18.5
		R	265 17 34.2	
	P ₈	D	90 47 20.7	90 47 28.2
		R	269 12 24.2	
	P ₆	D	90 45 19.2	90 45 24.1
		R	269 14 31.0	
	P ₄	D	90 20 24.0	92 20 30.0
		R	267 39 24.0	
	P ₂	D	93 42 35.8	93 42 40.9
		R	266 17 13.9	

ตารางที่ ง.1 (ต่อ)

Station		Vertical Reading	Mean \checkmark	Depression (-) or Elevation (+)
From	To			
D ₂	P ₇	90°43'18.5"	90°43'18.9"	-00°43'18.9"
		90 43 19.4		
	P ₅	92 20 34.8	92 20 34.6	-02 20 34.6
		92 20 34.5		
	P ₃	94 09 10.4	94 09 10.2	-04 09 10.2
		94 09 10.1		
	P ₁	94 48 15.2	94 48 15.1	-04 48 15.1
		94 48 14.9		
	P ₈	90 55 36.5	94 48 35.3	-00 55 35.3
		94 48 34.2		
	P ₆	90 57 13.9	90 57 13.5	-00 57 13.5
		90 57 13.9		
	P ₄	92 44 28.9	92 44 28.2	-02 44 28.2
		92 44 27.4		
	P ₂	94 14 18.0	94 14 18.8	-04 14 18.8
		94 14 19.6		

ตารางที่ ง.1 (ต่อ)

Station		Vertical Reading	Mean	Depression (-) or Elevation (+)
From	To			
D ₁	P ₇	90°38'06".2	90°38'06".5	-00°38'06".5
		90 38 06.8		
	P ₅	92 23 22.6	92 23 16.4	-02 23 16.4
		92 23 10.1		
	P ₃	94 16 19.1	94 16 18.8	-04 16 18.8
		94 16 18.6		
	P ₁	94 42 15.6	94 42 17.1	-04 42 17.1
		94 42 18.5		
	P ₈	90 47 27.6	90 47 27.9	-00 47 27.9
		90 47 28.2		
	P ₆	90 45 25.1	90 45 24.6	-00 45 24.6
		90 45 24.1		
	P ₄	92 20 28.5	92 20 29.2	-02 20 29.2
		92 20 30.0		
	P ₂	93 42 48.4	93 42 44.6	-03 42 44.6
		93 42 40.9		

ประวัติผู้เขียน

นายประกอบ มณีเนตร เกิดวันที่ 24 กุมภาพันธ์ 2494 ณ อำเภอ กุฉินารายณ์
จังหวัดกาฬสินธุ์ สำเร็จการศึกษาระดับปริญญาตรี สาขาวิศวกรรมโยธา จากคณะวิศวกรรมศาสตร์ มหาวิทยาลัยขอนแก่น เมื่อ ปี พ.ศ. 2516 ปัจจุบันดำรงตำแหน่งอาจารย์
อาจารย์ประจำแผนกวิศวกรรมสำรวจ ภาควิชาวิศวกรรมโยธา คณะวิศวกรรมศาสตร์ มหาวิทยาลัยขอนแก่น และรักษาการในตำแหน่งหัวหน้างานรักษาความปลอดภัย มหาวิทยาลัยขอนแก่น
อีกตำแหน่งหนึ่ง



ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย