

1983/60. A FORTRAN program for calculating the gravitational attraction of polygonal bodies with infinite strike length

R.G. Richardson

*Abstract*

This program calculates the gravitational attraction of one or more polygonal bodies of infinite strike length at a number of points along a traverse perpendicular to the body strike. The output from the program is a series of tables giving the distance of the station from the origin, the station elevation, and the gravity anomaly. If desired the progressive contributions of the bodies in a multi-body model may be printed.

THE PROGRAM

*GRAV2D (Appendix 1)*

This program uses a simplification of the STKLMT routines (Milsom and Worthington, 1977) to calculate the gravitational attraction of a polygonal body of infinite strike length. The program flow is controlled by a variable at the end of each data set which allows re-entry to various stages of the calculations. The program is run using a previously created disk file assigned to logical unit 5 for input and a lineprinter, assigned to logical unit 6, for output. For convenience of calculation the traverse starts at the origin and extends only in the positive X direction. The bodies, however, may have negative X co-ordinates.

The input data read from logical unit 5 is:

*Measurement unit specification*

Hkm	Horizontal units	0 for kilometres, 1 for metres
Vkm	Vertical units	0 for kilometres, 1 for metres

*Traverse specifications*

DL Calculation point interval  
 NSTAT The number of calculation points  
 HSTATN(P) Elevation of the Pth calculation point (positive upward).  
 If the elevations are all to be zero then set HSTATN(1) = -2000.0 and no further elevation data are needed. If elevations are specified, more than one may be input on each line.

*Overall body specifications*

TITLE An eighty-character title copied to the printer for clarification.  
 NBODY The number of body specifications following.

*Individual body specifications*

NSIDES The number of sides of the polygon  
 DENSTY The density contrast of the body (t/m<sup>3</sup>)  
 X(K), Y(K) Co-ordinates of the vertices of the body taken clockwise around the polygon. K = 1, ..., NSIDES.  
 Note that Y(K) is positive downward.

## Terminator

- KEY controls the program flow after the previous computation
- 3 program stops
  - 2 new body specifications are to be read and cumulative totals are to be cleared
  - 1 new body specifications are to be read and the attractions calculated added to the previous totals. This allows the contributions of individual parts of a model to be checked.
  - 0 read new traverse and body specifications
  - 1 used in ONE body case to change some of the body vertices
    - TITLE 80 characters on one line
    - NVERT the number of the vertex to be changed  
(NVERT = -1 when the changes have all been made)
    - X(NVERT), Y(NVERT) the new vertex co-ordinate
  - 2 used in ONE body case to change density contrast
    - TITLE 80 characters on one line
    - DENSTY New density contrast ( $t/m^3$ )
  - 3 used in ONE body case to change vertices and density contrast
    - TITLE 80 characters on one line.
    - DENSTY New density contrast ( $t/m^3$ )
    - NVERT Number of the vertex to be changed  
(NVERT = -1 when the changes have all been made)
    - X(NVERT), Y(NVERT) the new vertex co-ordinates

Appendix 2 shows a sample set of input data and Appendix 3 shows the corresponding output.

## REFERENCE

- MILSOM, J.; WORTHINGTON, G.A. 1977. Computer programs for rapid computation of gravity effects of two-dimensional and three-dimensional bodies. *Comput.Geosci.* 3:269-281.

[21 November 1983]

APPENDIX 1

Program GRAV2D

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#TITL GRAV2D.FTN - 2D GRAVITY MODELLING
C BASED ON STKLMT (COMPUTERS & GEOSCIENCES V3 PP 269-281)
C AND STACEYS METHOD (U606/2)
  DIMENSION X(100),HSTATN(100),Y(100),HCALC(100),SUM(100),DIST(100)
C SET UP FOR 100 CALCULATION POINTS AND 100 SIDES OF BODY
C
  LOGICAL HKM,VKM
C USED TO SET THE HORIZONTAL AND VERTICAL UNITS
  INTEGER KEY
C CONTROLS THE PROGRAM FLOW
  READ(5,*) IH,IV
C HORIZONTAL,VERTICAL UNITS 0=KM,1=M
  HKM=IH .EQ. 0
  VKM=IV .EQ. 0
  20 CONTINUE
C TO HERE TO READ NEW TRAVERSE INFORMATION
  READ(5,*) DL,NSTAT
C STATION INTERVAL,NUMBER OF STATIONS
  IF (NSTAT .GT. 100) STOP 'TOO MANY STATIONS'
  READ(5,*) HSTATN(1)
C READ THE FIRST HEIGHT AND IF IT IS <-1999. SET ALL HEIGHTS TO ZERO
  IF (HSTATN(1) .GT. -1999.0) THEN
    BACKSPACE 5
    READ(5,*) (HSTATN(I),I=1,NSTAT)
    FACT=1.0
    IF (.NOT. VKM) FACT=0.001
C CONVERSION FROM METRES IF NEEDED
    DO 30 I=1,NSTAT
      30 HCALC(I)=-HSTATN(I)*FACT
C CHANGE THE HEIGHT CONVENTION TO SUIT THE PROGRAM
    ELSE
      DO 31 I=1,NSTAT
        HCALC(I)=0.0
      31 HSTATN(I)=0.0
C SET ALL TO ZERO
    ENDIF
    40 CONTINUE
C TO HERE TO READ BODY DATA
    DO 41 I=1,NSTAT
      41 SUM(I)=0.0
C ZERO THE ARRAY USED TO ACCUMULATE THE TOTAL VALUES
    45 CONTINUE
C TO HERE TO ADD A NEW BODY AND ACCUMULATE THE ANOMALY - USEFUL
C FOR PUTTING A MODEL TOGETHER BIT BY BIT
    CALL HEAD(HKM,VKM)
C HEAD UP THE OUTPUT SECTION
    READ(5,*) NBODY
C NO OF BODIES
    NCOUNT=0
C COUNTER FOR NUMBER OF BODIES ACTUALLY READ
    50 CONTINUE
C ROUND TO HERE FOR EACH BODY
    READ(5,*) NSIDES,DENSTY
C NO OF SIDES OF BODY,DENSITY
    IF (NSIDES .GT. 100) STOP 'TOO MANY SIDES !!!!'
    READ(5,*) (X(I),Y(I),I=1,NSIDES)
    DO 51 I=1,NSIDES
      IF (.NOT. HKM) X(I)=X(I)*0.001

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      IF (.NOT. VKM) Y(I)=Y(I)*0.001
C CONVERT TO KM IF NECESSARY
      51 CONTINUE
C
      60 CONTINUE
C TO HERE FOR SINGLE BODY CALCULATION OR RECALCULATION WITH SAME BODY
      DO 61 I=1,NSTAT
      XC=FLOAT(I-1)*DL
C CALCULATION POINT
      CALL STKLMT(XC,HCALC(I),X,Y,NSIDES,DENSTY,1,NTMP,-100.0,IFLAG,G)
      SUM(I)=SUM(I)+G
      61 CONTINUE
C CALCULATE AT EACH POINT FOR EACH BODY AND ACCUMULATE TOTALS
      NCOUNT=NCOUNT+1
      IF (NCOUNT .LT. NBODY) GOTO 50
C IF MORE BODIES READ ANOTHER AND ADD TO PREVIOUS TOTAL
      DO 62 I=1,NSTAT
      62 DIST(I)=FLOAT(I-1)*DL
C USED FOR PRINTING DISTANCE ALONG TRAVERSE
      NROWS=NSTAT/2
C PRINT AS TWO SETS OF COLUMNS
      DO 63 I=1,NROWS
      POSNA=DIST(I)
      IF (.NOT. HKM) POSNA=POSNA*1000.0
C CONVERT TO METRES IF NECESSARY
      J=I+NROWS
      POSNB=DIST(J)
      IF (.NOT. HKM) POSNB=POSNB*1000.0
C CONVERT TO METRES IF NECESSARY
      WRITE(6,100) POSNA,HSTATN(I),SUM(I),POSNB,HSTATN(J),SUM(J)
100 FORMAT(2(F11.3,1X),F10.3,6X,F9.2,12X)
      63 CONTINUE
      IF (MOD(NSTAT,2) .NE. 0) THEN
C ODD NO OF CALCULATION POINTS
      POSNA=DIST(NSTAT)
      IF (.NOT. HKM) POSNA=POSNA*1000.0
C CONVERT TO METRES IF NECESSARY
      WRITE(6,100) POSNA,HSTATN(NSTAT),SUM(NSTAT)
      ENDIF
C FINISH PRINTING
C
C NOW FIND OUT WHAT TO DO NEXT
      READ(5,*) KEY
      IF (KEY .GE. 3 .OR. KEY .LT. -3) STOP
C END OF RUN
      WRITE(6,101)
101 FORMAT(////)
C SPACE A FEW LINES
      IF (KEY .EQ. 2) GOTO 40
C GET NEW BODY SPECIFICATIONS
      IF (KEY .EQ. 1) GOTO 45
C READ NEW BODY SPECIFICATIONS AND ADD TO EXISTING TOTAL
      IF (KEY .EQ. 0) GOTO 20
C NEW TRAVERSE AND BODY SPECIFICATIONS
      CALL HEAD(HKM,VKM)
      IF (KEY .EQ. -2 .OR. KEY .EQ. -3) READ(5,*) DENSTY
C NEW DENSITY
      IF (KEY .EQ. -1 .OR. KEY .EQ. -3) THEN
C GET NEW VERTICES
      70 CONTINUE

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      READ(5,*) IVERT
      IF (IVERT .NE. -1) THEN
      IF (IVERT .GT. NSIDES) STOP 'INVALID VERTEX NUMBER'
      BACKSPACE 5
      READ(5,*) ITMP,X(IVERT),Y(IVERT)
      IF (.NOT. HKM) X(IVERT)=X(IVERT)*0.001
      IF (.NOT. VKM) Y(IVERT)=Y(IVERT)*0.001
C CONVERT TO KM
      GOTO 70
      ENDIF
      ENDIF
      NBODY=1
      NCOUNT=1
      DO 71 I=1,NSTAT
71 SUM(I)=0.0
      GOTO 60
      END
      SUBROUTINE HEAD(HKM,VKM)
      REAL TITLE(20)
      LOGICAL HKM,VKM
      READ(5,100) TITLE
100 FORMAT(20A4)
      WRITE(6,200) TITLE
200 FORMAT(1X,20A4)
      WRITE(6,201)
201 FORMAT(2(4X,'POSITION',4X,'ELEVATION',7X,'ANOMALY',10X))
      IF (HKM) THEN
      IF (VKM) THEN
      WRITE(6,202)
      ELSE
      WRITE (6,203)
      ENDIF
      ELSE
      IF (VKM) THEN
      WRITE(6,204)
      ELSE
      WRITE(6,205)
      ENDIF
      ENDIF
202 FORMAT(2(6X,'(KM. )',7X,'(KM. )',6X,' (MILLIGAL) ',6X))
203 FORMAT(2(6X,'(KM. )',8X,'(M. )',6X,' (MILLIGAL) ',6X))
204 FORMAT(2(7X,'(M. )',7X,'(KM. )',6X,' (MILLIGAL) ',6X))
205 FORMAT(2(7X,'(M. )',8X,'(M. )',6X,' (MILLIGAL) ',6X))
      RETURN
      END
      SUBROUTINE STKLMT(XC,YC,X,Y,NSIDES,RHO,KSET,NLEVL,STRKL,IFLAG,F)

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C
C*****
C SUBPROGRAM TO COMPUTE GRAVITY FIELD DUE TO MODELS OF UNIFORM
C POLYGONAL CROSS-SECTION AND LIMITED HALF-STRIKE EXTENT, USING
C SUBROUTINE POLYGN TO COMPUTE FIELD OF MODEL OF INFINITE STRIKE
C LENGTH AND SUBROUTINE SLABFT TO PREPARE A LAMINA APPROXIMATED
C MODEL FOR END CORRECTIONS.
C
C          INPUTS
C XC,YC POINT OF CALCULATION ON PROFILE CROSSING BODY
C X,Y   VECTORS CONTAINING COORDINATES OF POLYGON VERTICES
C NSIDES NUMBER OF SIDES IN POLYGON
C RHO   POLYGON DENSITY IN GM/CC OR T/M**3
C KSET  SCALE PARAMETER SET AT 1,2,3,4,5 FOR DISTANCES IN KM.,
C       METRES, STATUTE MILES, FEET AND NAUTICAL MILES.

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C NIEVLS NUMBER OF LEVELS TO BE USED IN LAMINA APPROXIAMTION
C STRKL HALF-STRIKE-LENGTH. SET NEGATIVE FOR INFINITE MODEL.
C IFLAG INDICATOR TO AVOID MULTIPLE PREPARATION OF IDENTICAL
C   LAMINA MODELS. SET EQUAL TO ZERO BEFORE FIRST CALL FOR
C   A GIVEN POLYGON, AND THEREAFTER TO A POSITIVE INTEGER.
C   OUTPUT
C F FIELD OF MODEL, IN MILLIGALS
C
C MODIFIED TO WORK AS A CALL COMPATIBLE 2D ROUTINE
C*****
  DIMENSION X(1),Y(1),TWOGEE(5)
  DATA TWOGEE/13.34,.01334,21.48,.004068,24.74/
  F=0.
  RHOFAC=TWOGEE(KSET)*RHO
C
C*****
C CALCULATE FIELD OF INFINITE (TWO-DIMENSIONAL) POLYGONAL MODEL
C*****
  CALL POLYGN(XC,YC,X,Y,NSIDES,F)
C
C*****
C CHECK FOR NEGATIVE VALUE OF STRKL, INDICATING END CORRECTIONS
C NOT REQUIRED
C*****
  IF (STRKL .LT. 0.) GOTO 101
C
  101 F=F*RHOFAC
  RETURN
  END
  SUBROUTINE POLYGN(XC,YC,X,Y,N,F)
C
C*****
C SUBPROGRAM TO CALCULATE THE VERTICAL GRAVITATIONAL FIELD DUE
C TO A BODY INFINITE IN ONE HORIZONTAL DIRECTION AND OF CONSTANT
C CROSS-SECTION. METHOD REFERENCE TALWANI, WORZEL, LANDISMAN
C JGR64, P49, JANUARY 1959. CROSS-SECTION OF BODY IS POLYGONAL.
C ARGUMENTS DEFINED AS FOLLOWS-
C   INPUTS
C XC,YC X AND Y COORDINATES OF POINT OF CALCULATION
C N NUMBER OF SIDES TO POLYGON
C X,Y VECTORS STORING COORDINATES OF POLYGON VERTICES
C   OUTPUT
C F VERTICAL FIELD AT (XC,YC) DUE TO POLYGONAL BODY. MUST
C BE MULTIPLIED BY SCALING FACTOR (=13.34 FOR INPUT KM,
C T/M**3 AND OUTPUT IN MILLIGALS) AND DENSITY IN CALLING
C ROUTINE.
C NOTE THAT Y() AND YC ARE BOTH SPECIFIED AS POSITIVE DOWN
C*****
  DIMENSION X(1),Y(1)
  F=0.
  PI=3.141592
  ZERO=.1E-6
C
C*****
C INITIAL VALUES OF 'A' FUNCTIONS DEFINED FOR USE IN DO-LOOP
C*****
  XA=X(N)-XC
  YA=Y(N)-YC
  IF (ABS(XA) .LT. ZERO) GOTO 101
  IF (ABS(YA) .LT. ZERO) GOTO 103

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    TNTHTA=YA/XA
    THTA=ATAN2(YA, XA)
    CSTHTA=XA/SQRT(XA*XA+YA*YA)
    GOTO 104
103 TNTHTA=0.
    IF (XA .GT. 0.) GOTO 105
    THTA=PI
    CSTHTA=-1.
    GOTO 104
105 THTA=0.
    CSTHTA=1.
    GOTO 104
101 THTA=0.5*PI
    CSTHTA=0.
    TNTHTA=99999.
C
C*****
C INITIAL VALUES OF 'A' FUNCTIONS STORED FOR USE AS FINAL VALUES
C OF 'B' FUNCTIONS
C*****
    104 TNTHTC=TNTHTA
    CSTHTC=CSTHTA
    THTC=THTA
    XCA=XA
    YCA=YA
C
C*****
C ENTER LOOP TO CALCULATE THE CONTRIBUTION FROM EACH SIDE IN
C TURN TO THE TOTAL F AND ADD IT INTO F.
C*****
    DO 12 I=1, N
C
C*****
C IF I=N, THE CIRCUIT OF THE POLYGON IS ABOUT TO BE COMPLETED AND
C THE 'B' FUNCTIONS REQUIRED ARE ALREADY STORED AS 'C' FUNCTIONS.
C*****
    IF (I .NE. N) GOTO 202
    XB=XCA
    YB=YCA
    IF (ABS(XB) .LT. ZERO) GOTO 201
    TNTHTB=TNTHTC
    THTB=THTC
    CSTHTB=CSTHTC
    GOTO 204
    202 XB=X(I)-XC
    YB=Y(I)-YC
C
C*****
C CASES WHERE POINT B AND THE POINT OF CALCULATION LIE IN THE
C SAME HORIZONTAL OR VERTICAL PLANE REQUIRES SPECIAL TREATMENT
C*****
    IF (ABS(XB) .LT. ZERO) GOTO 201
    IF (ABS(YB) .LT. ZERO) GOTO 203
    TNTHTB=YB/XB
    THTB=ATAN2(YB, XB)
    CSTHTB=XB/SQRT(XB*XB+YB*YB)
    GOTO 204
    203 TNTHTB=0.
    IF (XB .GT. 0.) GOTO 205
    THTB=PI

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      CSTHTB=-1.
      GOTO 204
205 THTB=0.
      CSTHTB=1.
C
C*****
C REMAINING SPECIAL CASES ISOLATED
C*****
      204 IF (THTA .EQ. THTB) GOTO 301
          IF (XA .EQ. XB) GOTO 206
          IF (YA .EQ. YB) GOTO 207
          XPHI=XB-XA
          YPHI=YB-YA
          TANPHI=YPHI/XPHI
          IF (TANPHI .EQ. TNTHTB) GOTO 301
          SCSPHI=YPHI*XPHI/(YPHI*YPHI+XPHI*XPHI)
          A=XB-YB/TANPHI
          IF (ABS(XA) .LT. ZERO) GOTO 208
C
C*****
C CALCULATE FOR THE GENERAL CASE
C*****
          FLOG=CSTHTA*(TNTHTA-TANPHI)/(CSTHTB*(TNTHTB-TANPHI))
          Z=A*SCSPHI*(THTA-THTB+TANPHI*A*LOG(FLOG))
          GOTO 401
C
C*****
C SPECIAL CASE XB=0. FIRST CHECK IS FOR DOUBLE ZERO CONDITION
C WHICH MAKES Z EQUAL ZERO.
C*****
      201 THTB=0.5*PI
          CSTHTB=0.
          TNTHTB=99999.
          IF (ABS(YB) .LT. ZERO .OR. ABS(XA) .LT. ZERO) GOTO 301
          YPHI=YB-YA
          TANPHI=-YPHI/XA
          FLOG=CSTHTA*(TNTHTA-TANPHI)
          Z=-YB*XA*XA*(THTA-THTB+TANPHI*A*LOG(FLOG))/(YPHI*YPHI+XA*XA)
          GOTO 401
C
C*****
C SPECIAL CASE XA=XB
C*****
      206 Z=XA*A*LOG(CSTHTA/CSTHTB)
          GOTO 401
C
C*****
C THE SPECIAL CASE YA=YB. NOTE THAT IF XA=0, THTA=.5*PI
      207 Z=YA*(THTB-THTA)
          GOTO 401
C
C*****
C THE SPECIAL CASE FOR XA=0. NOTE THAT THTA IN THIS CASE IS .5*PI
C THE FIRST CHECK IS FOR DOUBLE ZERO CONDITION WHICH MAKES Z ZERO
C*****
      208 IF (ABS(YA) .LT. ZERO) GOTO 301
          FLOG=CSTHTB*(TNTHTB-TANPHI)
          Z=-A*SCSPHI*(THTB-THTA+TANPHI*A*LOG(FLOG))
C
C*****

```

C Z IS ADDED TO F BEFORE LOOPING. ALL ---A FUNCTIONS ARE THEN SET  
C FOR NEXT CYCLE TO PRESENT VALUE OF ALL ---B FUNCTIONS.

C\*\*\*\*\*  
401 F=F+Z

C

C\*\*\*\*\*  
C ALL CONDITIONS WHICH IMPLY Z=0 HAVE BEEN REDIRECTED TO STATEMENT  
C 301, THUS BY-PASSING THE ADDITION STATEMENT.

C\*\*\*\*\*

301 THTA=THTB  
TNTHTA=TNTHTB  
CSTHTA=CSTHTB  
XA=XB  
YA=YB

12 CONTINUE  
RETURN  
END

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APPENDIX 2

Sample set of input data

```

0 0
10 10
0.0.5.2.0.55.85.1.75.0
ONE FIVE SIDED BODY
1
5. -0.25
6. .5
9.2.5
7.5.5
1.3.0
2. .0
-3
CHANGE VERTEX 1 FROM 6.0.5 TO 6.1.7 AND DENSITY CONTRAST TO -0.3
-0.3
1 6.1.7
-1
-2
CHANGE DENSITY CONTRAST BACK TO -0.25
-0.25
-1
CHANGE VERTEX 2 FROM 9.2.5 TO 30.0.01
2 30.0.01
-1
2
NEW MODEL WITH EXTRA FOUR SIDED BODY
2
5. -0.25
6.0.25
9.2.5
7.5.5
1.3.0
2.0.0
4. -0.1
6.0.25
10.0.2
12.7.6
9.2.5
0
20.5
-2000.
FOUR SIDED BODY WITH FIVE STATIONS AT ZERO ELEVATION
1
4. -0.1
6.0.25
10.0.2
12.7.6
9.2.5
2
A FIVE SIDED BODY
1
5 -0.25
6.0.25 9.2.5 7.5.5 1.3.0 2.0.0
1
ADD A FOUR SIDED BODY TO THE ABOVE
1
4 . -0.1
6.0.25 10.0.2 12.7.6 9.2.5
3

```

ONE FIVE SIDED BODY

POSITION (KM.)	ELEVATION (KM.)	ANOMALY (MILLIGAL)	POSITION (KM.)	ELEVATION (KM.)	ANOMALY (MILLIGAL)
0.000	0.000	-8.80	50.000	0.550	-0.15
10.000	0.000	-8.45	60.000	0.850	-0.11
20.000	0.500	-1.28	70.000	1.000	-0.08
30.000	0.200	-0.43	80.000	0.750	-0.06
40.000	0.000	-0.20	90.000	0.000	-0.03

CHANGE VERTEX 1 FROM 6.0.5 TO 6.1.7 AND DENSITY CONTRAST TO -0.3

POSITION (KM.)	ELEVATION (KM.)	ANOMALY (MILLIGAL)	POSITION (KM.)	ELEVATION (KM.)	ANOMALY (MILLIGAL)
0.000	0.000	-9.87	50.000	0.550	-0.16
10.000	0.000	-8.74	60.000	0.850	-0.12
20.000	0.500	-1.38	70.000	1.000	-0.09
30.000	0.200	-0.47	80.000	0.750	-0.06
40.000	0.000	-0.20	90.000	0.000	-0.04

CHANGE DENSITY CONTRAST BACK TO -0.25

POSITION (KM.)	ELEVATION (KM.)	ANOMALY (MILLIGAL)	POSITION (KM.)	ELEVATION (KM.)	ANOMALY (MILLIGAL)
0.000	0.000	-8.22	50.000	0.550	-0.13
10.000	0.000	-7.29	60.000	0.850	-0.10
20.000	0.500	-1.15	70.000	1.000	-0.07
30.000	0.200	-0.39	80.000	0.750	-0.05
40.000	0.000	-0.19	90.000	0.000	-0.03

CHANGE VERTEX 2 FROM 9.2.5 TO 30.0.01

POSITION (KM.)	ELEVATION (KM.)	ANOMALY (MILLIGAL)	POSITION (KM.)	ELEVATION (KM.)	ANOMALY (MILLIGAL)
0.000	0.000	-10.20	50.000	0.550	-0.45
10.000	0.000	-26.23	60.000	0.850	-0.31
20.000	0.500	-17.71	70.000	1.000	-0.22
30.000	0.200	-2.71	80.000	0.750	-0.15
40.000	0.000	-0.68	90.000	0.000	-0.09

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Sample of output

APPENDIX 3

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NEW MODEL WITH EXTRA FOUR SIDED BODY

POSITION (KM.)	ELEVATION (KM.)	ANOMALY (MILLIGAL)	POSITION (KM.)	ELEVATION (KM.)	ANOMALY (MILLIGAL)
0.000	0.000	-9.17	50.000	0.550	-0.17
10.000	0.000	-13.81	60.000	0.850	-0.13
20.000	0.500	-1.64	70.000	1.000	-0.09
30.000	0.200	-0.52	80.000	0.750	-0.07
40.000	0.000	-0.24	90.000	0.000	-0.04

FOUR SIDED BODY WITH FIVE STATIONS AT ZERO ELEVATION

POSITION (KM.)	ELEVATION (KM.)	ANOMALY (MILLIGAL)	POSITION (KM.)	ELEVATION (KM.)	ANOMALY (MILLIGAL)
0.000	0.000	-0.30	40.000	0.000	-0.04
20.000	0.000	-0.30	60.000	0.000	-0.01
80.000	0.000	-0.01			

A FIVE SIDED BODY

POSITION (KM.)	ELEVATION (KM.)	ANOMALY (MILLIGAL)	POSITION (KM.)	ELEVATION (KM.)	ANOMALY (MILLIGAL)
0.000	0.000	-8.87	40.000	0.000	-0.21
20.000	0.000	-1.12	60.000	0.000	-0.08
80.000	0.000	-0.04			

ADD A FOUR SIDED BODY TO THE ABOVE

POSITION (KM.)	ELEVATION (KM.)	ANOMALY (MILLIGAL)	POSITION (KM.)	ELEVATION (KM.)	ANOMALY (MILLIGAL)
0.000	0.000	-9.17	40.000	0.000	-0.24
20.000	0.000	-1.41	60.000	0.000	-0.10
80.000	0.000	-0.05			

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