1984/86. GRVTIE - A FORTRAN program to determine drift corrected meter reading differences between alternately read tie stations

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Abstract

The FORTRAN program GRVTIE calculates the drift-corrected meter reading difference between two alternately read tie stations.

INTRODUCTION

In the field, two gravity tie stations should be read alternately, where a reading may consist of one or more actual physical measurements. In the case of multiple measurements, the measurements are averaged and their corresponding times are also averaged to give a single "reading" at a single time.

Let the stations be labelled A and B. Any group of three consecutive readings (*e.g.* ABA or BAB) is valid for determination of the gravity difference between the two stations. Taking the ABA case as an example, a reading at B will fall in time between two consecutive A readings. We wish to predict the gravity reading at A at the time of reading B. In order to do this, we linearly interpolate between the two A readings. The difference between the B reading and the A reading at the B reading time is the value we seek.

This procedure is followed alternately for stations A and B until there are no more readings. If the combined total of readings at A and B is N then there will be N-2 values for the difference between them.

RUNNING THE PROGRAM

The program runs interactively through a .CSS on the Department of Mines Perkin-Elmer 8/32 computer. Type "GRVTIE" to initiate execution. Then enter the names of the two tie stations (up to a maximum of 20 characters) in response to the prompts. The name of the station read first should be entered as station A. The program will then ask for the number of readings (actual measurements) comprising each reading. This prompt will alternately specify station A and station B and the answers should be in chronological order. When the last number has been entered return a zero in reply to the prompt in order to terminate this part of the program. The times and readings (*i.e.* actual physical measurements) will then be requested, with the program specifying which value it requires - the values will be requested in correct chronological sequence unless you have made a mistake. Times must be entered in HHMM format but gravity meter readings may be entered in free format. No provision is made for operator mistakes (you will have to rerun the program) because the number of values for any one run is expected to be relatively small. A list of the calculated meter reading differences between stations A and B is printed without supporting documentation, again because the number of results will usually be small.

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APPENDIX 1

GRVTIE listing

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C*
C PROGRAM TO CALCULATE METER READING DIFFERENCES BETWEEN TIE STATIONS
C
      INTEGER INR(20)
      REAL GRAV(20),TIME(20)
      CHARACTER *20 STAT(2),NAME
      WRITE(5,10)
   10 FORMAT(1X,'ENTER NAME OF STATION A')
      READ(5,12) STAT(1)
   12 FORMAT(A20)
      WRITE(5,14)
   14 FORMAT(1X,'ENTER NAME OF STATION B')
      READ(5,12) STAT(2)
      NAME=STAT(1)
      KOUNT=0
   20 WRITE(5,22) NAME
   22 FORMAT(1X,'ENTER NUMBER OF READINGS AT ',A20)
      READ(5,*) INR(KOUNT+1)
      IF(INR(KOUNT+1).EQ.0) GO TO 40
      KOUNT=KOUNT+1
      IF(NAME.EQ.STAT(1)) THEN
      NAME=STAT(2)
      ELSE
      NAME=STAT(1)
      ENDIF
      GO TO 20
   40 DO 100 K=1,KOUNT
      TEST=K/2.0
      NAME=STAT(1)
      IF((TEST-INT(TEST)).LT.1E-6) NAME=STAT(2)
      RGRAV=0.0
      ITIME=0
      DO 80 J=1,INR(K)
   59 WRITE(5,60) NAME
   60 FORMAT(1X,A20,'TIME?')
      READ(5,62,ERR=59) IHRS,IMINS
   62 FORMAT(2I2)
      ITIME=IHRS*60+IMINS+ITIME
   69 WRITE(5,70) NAME
   70 FORMAT(1X,A20,'READING?')
      READ(5,*,ERR=69) TGRAV
      RGRAV=RGRAV+TGRAV
   80 CONTINUE
      TIME(K)=ITIME/INR(K)
      GRAV(K)=RGRAV/INR(K)
      WRITE(5,85) TIME(K),GRAV(K)
   85 FORMAT(1X,'TIME IS ',F6.1,' READING IS ',F7.2)
  100 CONTINUE
      WRITE(6,140)
  140 FORMAT(1X,'    ')
      DO 200 J=1,(KOUNT-2)
      DIFF=GRAV(J+1)-((GRAV(J+2)-GRAV(J))*(TIME(J+1)-TIME(J))/(TIME(J+2)
     1-TIME(J))+GRAV(J))
      WRITE(6,150) DIFF
  150 FORMAT(1X,F6.2)
  200 CONTINUE
      END
```