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C CASE STUDY 10
C THE GAUSS-SEIDEL METHOD FOR SOLVING SIMULTANEOUS EQUATIONS
C
C THE PROGRAM SOLVES A SYSTEM OF N EQUATIONS IN N UNKNOWNNS.
C N MAY NOT EXCEED 80; N IS READ AS INPUT.
C ONLY THE NON-ZERO ELEMENTS NEED BE ENTERED, ONE ELEMENT PER DATA
C CARD, WITH ROW AND COLUMN NUMBERS ON EACH CARD.
C A ROW NUMBER OF 99 ACTS AS AN END-OF-DATA SENTINEL.
C THE PROGRAM READS THE FOLLOWING PARAMETERS PRIOR TO ENTERING THE DATA
C N -- THE NUMBER OF EQUATIONS IN THE SYSTEM FOR THIS RUN
C MAXIT -- THE MAXIMUM NUMBER OF ITERATIONS TO BE PERMITTED
C EPSLON -- THE CONVERGENCE CRITERION
C BIGGST -- THE MAXIMUM SIZE (IN ABSOLUTE VALUE) TO BE PERMITTED
C OF ANY COEFFICIENT OR CONSTANT TERM
C ALL INPUT IS CHECKED FOR VALIDITY, EVEN IF AN ERROR IS FOUND.
C
C
C      DIMENSION A(80, 81), X(80)
C      LOGICAL OK
C
C CLEAR ARRAYS
C      DO 20 I = 1, 80
C        X(I) = 0.0
C      DO 10 J = 1, 81
C        A(I, J) = 0.0
C 10    CONTINUE
C 20    CONTINUE
C
C READ CONTROL PARAMETERS DESCRIBED IN INTRODUCTORY COMMENTS
C      READ (5, 100) N, MAXIT, EPSLON, BIGGST
C      NPLUS1 = N + 1
C
C READ THE ELEMENTS OF THE ARRAYS, WITH CHECKING
C DO LOOP IS USED TO CONTROL MAXIMUM NUMBER OF ELEMENTS
C FIRST SET ERROR COUNT TO ZERO
C      NERROR = 0
C      LIMIT = N*NPLUS1 + 1
C      DO 30 K = 1, LIMIT
C        READ (5, 100) I, J, TEMP
C        IF ( I .EQ. 99 ) GO TO 41
C        OK = .TRUE.
C        IF ( (I .LT. 1)
C 1         .OR. (I .GT. N)
C 2         .OR. (J .LT. 1)
C 3         .OR. (J .GT. NPLUS1)
C 4         .OR. (ABS(TEMP) .GT. BIGGST) ) OK = .FALSE.
C        IF ( OK ) A(I, J) = TEMP
C        IF ( .NOT. OK ) WRITE (6, 110) I, J, TEMP
C        IF ( .NOT. OK ) NERROR = NERROR + 1
C 30    CONTINUE
C
C IF DO IS SATISFIED, THERE WERE TOO MANY DATA CARDS FOR THE
C VALUE OF N THAT WAS SPECIFIED -- WRITE ERROR COMMENT
C      WRITE (6, 120)
C      STOP
C
C ALL DATA CARDS HAVE BEEN READ -- CHECK ERROR COUNT AND STOP IF ANY
C 41 IF ( NERROR .NE. 0 ) WRITE ( 6, 130) NERROR
C     IF ( NERROR .NE. 0 ) STOP
C
C BEGIN ITERATION SCHEME -- DO LOOP COUNTS THE NUMBER OF ITERATIONS
C DO 70 ITER = 1, MAXIT
C
C     ... NEXT STATEMENT IS EXECUTED ONCE PER SWEEP OF THE SYSTEM
C     RESID = 0.0
C
C     ... INDEX I SELECTS A ROW
C     DO 60 I = 1, N
C
C     ... NEXT STATEMENT IS EXECUTED ONCE PER ROW
C     SUM = 0.0
C
C     ... GET SUM OF TERMS IN ROW I, NOT INCLUDING DIAGONAL TERM
C     DO 50 J = 1, N
C       IF ( J .NE. I ) SUM = SUM + A(I,J)*X(J)

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