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c      This program finds temperature distribution in a two-stream
c      annular fuel rod. The data should be specified in input file ROD.IN
c      Results in the form of the augmented matrix coefficients are stored
c      in file SET.IN
c      Option 5 can then be used to find the unknown coefficients
c      (See Example IVa.6.3)
      implicit real*8(a-h,o-z)
      dimension b(6,7)
      data k/6/

c
1000  continue
1002  format(////////////////////////////////////)
      write(*,1002)
      Print *,'===== Temperature Distribution In A Fuel Rod ====='
      print *,' '
      print *,' '
      Print *,'Input Data Must Be Specified in ROD.IN'
      print *,' '
      print *,'Enter  > 2: To read data from ROD.IN'
      print *,'      > 1: Instruction to prepare ROD.IN'
      print *,'      > 0: Exit'
      print *,' '
      read(*,*) ij
      if(ij.lt.1) stop
      if(ij.eq.1) call des
      if(ij.eq.1) go to 1000
      open(5,file='Rod.in')
      open(6,file='Rod.out')
      open(7,file='Set.in')

c
      do 1 i=1,6
      do 1 j=1,7
      b(i,j) = 0.0
1      continue
      read(5,*) r1,r2,r3,r4
      r1=r1/100.
      r2=r2/100.
      r3=r3/100.
      r4=r4/100.
      read(5,*) akc,akf,hi,ho,Ti,To
      read(5,*) qdotp
      q3=(qdotp*3.2808*1000)/(3.14*(r3*r3-r2*r2))
      B(1,1) = hi*dlog(r1)-(akc/r1)
      B(1,2) = hi
      B(2,1) = dlog(r2)
      B(2,2) = 1
      B(2,3) = -dlog(r2)
      B(2,4) = -1
      B(3,1) = akc/r2
      B(3,3) = -akf/r2
      B(4,3) = dlog(r3)
      B(4,4) = 1
      B(4,5) = -dlog(r3)
      B(4,6) = -1
      B(5,3) = akf/r3
      B(5,4) = 1
      B(5,5) = -akc/r3
      B(6,5) = ho*dlog(r4)+(akc/r4)
      B(6,6) = ho
      B(1,7) = hi*Ti
      B(2,7) = -q3*r2*r2/(4.*akf)
      B(3,7) = -q3*r2/2.
      B(4,7) = q3*r3*r3/(4.*akf)
      B(5,7) = q3*r3/2.
      B(6,7) = ho*To

c
      write(6,2) r1,r2,r3,r4
      write(6,2) akc,akf,hi,ho,Ti,To
      write(6,4) q3
      write(7,5) k
      do 3 i=1,6
      write(6,55) (B(i,j), j = 1,7)
      write(7,4) (B(i,j), j = 1,7)
3      continue
2      format(6f11.3)
4      format(7e11.3)
5      format(i5)
55     format(6f11.3,e10.3)
7      continue

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stop
end
subroutine des
write(*,1)
Print *, '==== Temperature Distribution In A Fuel Rod ====='
print *, ' '
print *, ' '
print *, 'The input file ROD.IN has only three lines'
print *, 'Line one consists of four values:'
print *, 'The first value is the smallest radius'
print *, 'The last value is the largest radius'
print *, 'Line two contains six values'
print *, 'k of cladding, k of fuel, h_inside, h_outside, T_inside,
1 and T_outside'
print *, 'Line three contains the linear heat generation rate'
print *, ' '
print *, 'Enter > 0:Return'
read(*,*) i
1 format(////////////////////////////////////)
return
end

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