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1 program questao2
2   implicit none
3   real, dimension(1000, 1000) :: A, C
4   real, dimension(1000) :: X, Y, Z, B, rho
5   real :: ER, E0, AA, BB, D, DX, DY, DL, R, sum, Q
6   real, parameter :: pi = 4.D0*DATAN(1.D0)
7   integer :: N, M, NT, K1, K2, K3, I, J, K
8
9   ER = 1.0
10  E0 = 8.8541E-12
11  AA = 1.0
12  BB = 1.0
13  D = 1.0
14  N = 25
15  NT = 2*N
16  M = sqrt(real(N, 8))
17  DX = AA/M
18  DY = BB/M
19  DL = DX
20  A = 0.0
21
22  K = 0
23  do K1 = 1, 2
24    do K2 = 1, M
25      do K3 = 1, M
26        K = K + 1
27        X(K) = DX*(K2 - 0.5)
28        Y(K) = DY*(K3 - 0.5)
29      end do
30    end do
31  end do
32
33  do K1 = 1, N
34    Z(K1) = 0.0
35    Z(K1+N) = D
36  end do
37
38  do I = 1, NT
39    do J = 1, NT
40      if ( I==J ) then
41        A(I,J) = DL*0.8814/(pi*E0)
42      else
43        R = sqrt( (X(I)-X(J))**2 + (Y(I)-Y(J))**2 + (Z(I)-Z(J))**2 )
44        A(I,J) = DL**2/(4*pi*E0*R)
45      end if
46    end do
47  end do
48
49  do K = 1, N
50    B(K) = 1.0
51    B(K+N) = -1.0
52  end do
53
54  call invert(A, C, NT)
55  do i = 1, NT
56    rho(i) = 0
57    do j = 1, NT
58      rho(i) = rho(i)+C(i,j)*B(j)
59    end do
60  end do

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61
62     sum = 0.0
63
64     do i = 1, N
65         sum = sum + rho(i)
66     end do
67     Q = sum*(DL**2)
68     print *, abs(Q)/2.0
69     C = abs(Q)/2.0
70 end program questao2
71
72 subroutine invert(a, C, n)
73     implicit none
74     real, dimension(1000,1000) :: a, C, L, U
75     real, dimension(1000) :: b, d, x
76     real :: coeff
77     integer :: i, j, k, n
78
79     L = 0.0
80     U = 0.0
81     b = 0.0
82     do k = 1, n-1
83         do i = k+1, n
84             coeff = a(i,k)/a(k,k)
85             L(i,k) = coeff
86             do j = k+1, n
87                 a(i,j) = a(i,j)-coeff*a(k, j)
88             end do
89         end do
90     end do
91
92     do i = 1, n
93         L(i,i) = 1.0
94     end do
95
96     do j = 1, n
97         do i = 1, j
98             U(i,j) = a(i,j)
99         end do
100     end do
101
102     do k = 1, n
103         b(k) = 1.0
104         d(1) = b(1)
105         do i = 2, n
106             d(i) = b(i)
107             do j = 1, i-1
108                 d(i) = d(i) - L(i,j)*d(j)
109             end do
110         end do
111         x(n) = d(n)/U(n,n)
112         do i = n-1, 1, -1
113             x(i) = d(i)
114             do j = n, i+1, -1
115                 x(i)=x(i)-U(i,j)*x(j)
116             end do
117             x(i) = x(i)/U(i,i)
118         end do
119         do i = 1, n
120             C(i,k) = x(i)

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121     end do
122     b(k) = 0.0
123 end do
124 end subroutine invert
125
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