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APPENDIX

SOURCE CODE FOR CALCULATION MODULE

```
Dim Temp() As Double
Dim TNew() As Double
Dim TOld() As Double
Dim TF() As Double
Dim bbb() As Double
Dim ccc() As Double
Dim ddd() As Double
Dim eee() As Double
Dim X() As Double
Dim beta() As Double
Dim gramma() As Double
Dim z() As Integer
Dim s() As Integer
Dim i As Integer
Dim j As Integer
Dim k As Integer
Dim R As Integer
Dim RX As Integer
Dim RY As Integer
Dim RZAs Integer
Dim RT As Integer
Dim N As Integer
Dim w As Integer
Dim Gx As Integer
Dim Gy As Integer
Dim Gz As Integer
Dim Gt As Integer
Dim Hx As Integer
Dim Jx As Single
Dim Hy As Integer
Dim Jy As Single
Dim Hz As Integer
Dim Jz As Single
Dim Ht As Integer
Dim Jt As Single
Dim Constant As Single
Dim DeltaX As Single
Dim DeltaY As Single
Dim DeltaZ As Single
Dim DeltaT As Single
Dim SizeX As Single
Dim SizeY As Single
Dim SizeZ As Single
Dim a As Single
Dim aa As Single
Dim b As Single
Dim bb As Single
Dim strRange As String
Dim srtRange2 As String
Dim ii As Integer
```

```
Dim xx As String
Dim iLoop1  As Integer
Dim iLoop2  As Integer
Dim stBX As String
Dim L As Integer

Private Sub Form_Load()
      Set xlApp = CreateObject("Excel.Application")
      Set xlBook = xlApp.Workbooks.Add
      Set xlSheet1 = xlBook.Worksheets(1)
      Sheets("Sheet3").Select
      Sheets.Add
      Sheets("Sheet3").Select
      Sheets.Add
      Sheets("Sheet3").Select
      Sheets("Sheet3").Move Before:=Sheets(3)
      xlApp.AddIns.Add FileName:="C:\MATLABR11\exlink\excllink.xla"
      xlApp.AddIns("Excel Link 1.1.2  for use with MATLAB").Installed = False
      xlApp.AddIns("Excel Link 1.1.2  for use with MATLAB").Installed = True
      xlApp.Visible = True
      Form1.Show
End Sub
Private Sub Form_Unload(Cancel As Integer)
 xlApp.Quit
End Sub
Private Sub cmdFinish_Click()
      Form2.Enabled = False
      Form2.Hide
      CheckTextFinish
      a = Val(txtA.Text)
      DeltaX = Val(txtDeltaX.Text)
      Constant = Val(txtConst.Text)
      SizeX = Val(txtSizeX.Text)
      RX = SizeX / DeltaX
      Gx = Val(txtGx.Text)
      ReDim Temp(0 To RX)
      ReDim TOld(0 To RX)
      ReDim TNew(0 To RX)
      N = 1
      For i = 0 To RX
            Temp(i) = txtInitialGuess.Text
      Next i
      Temp(0) = txtX1.Text
      Temp(RX) = txtX2.Text
      For i = 1 To (RX - 1)
        Temp(i) = (Temp(i + 1) + Temp(i - 1) - (Constant * (DeltaX) ^ 2 / a)) / 2
      Next i
      GS_1D_Laplace
End Sub
Sub GS_1D_Laplace()
   For i = 0 To (RX)
        TOld(i) = Temp(i)
   Next i
      For i = 1 To (RX - 1)
        Temp(i) = (Temp(i + 1) + Temp(i - 1) - (Constant * (DeltaX) ^ 2 / a)) / 2
      Next i
```

```
      For i = 0 To (RX)
        TNew(i) = Temp(i)
      Next i
    N = N + 1
    If txtInitialGuess.Text = 0 Then
    For i = 1 To RX - 1
        If Abs(TOld(i) - TNew(i)) >= 0.0000005 Then
          GS_1D_Laplace
        ElseIf Abs(TOld(i) - TNew(i)) < 0.0000005 Then
          If i = RX - 1 Then
          Pos_1D_Elliptic
          End If
        End If
    Next i
    Else
    For i = 1 To RX - 1
        If Abs((TOld(i) - TNew(i)) / TNew(i)) >= 0.0000005 Then
          GS_1D_Laplace
        ElseIf Abs((TOld(i) - TNew(i)) / TNew(i)) < 0.0000005 Then
          If i = RX - 1 Then
          Pos_1D_Elliptic
          End If
        End If
    Next i
    End If
End Sub
Private Sub cmdFinish_Click()
      Form3.Enabled = False
      Form3.Hide
      CheckTextFinish
      a = Val(txtA.Text)
      b = Val(txtB.Text)
      DeltaX = Val(txtDeltaX.Text)
      DeltaY = Val(txtDeltaY.Text)
      Constant = Val(txtConst.Text)
      SizeX = Val(txtSizeX.Text)
      SizeY = Val(txtSizeY.Text)
      RX = SizeX / DeltaX
      RY = SizeY / DeltaY
      Gx = Val(txtGx.Text)
      Gy = Val(txtGy.Text)
      aa = a / (DeltaX) ^ 2
      bb = b / (DeltaY) ^ 2
      If optGauss.Value = True Then
        ReDim Temp(0 To RX, 0 To RY)
        ReDim TOld(0 To RX, 0 To RY)
        ReDim TNew(0 To RX, 0 To RY)
        N = 1
        For i = 0 To RX
          For j = 0 To RY
            Temp(i, j) = txtInitialGuess.Text
          Next j
        Next i
        For j = 1 To RY - 1
          Temp(0, j) = txtX1.Text
          Temp(RX, j) = txtX2.Text
```

```
        Next j
        For i = 1 To RX - 1
          Temp(i, 0) = txtY1.Text
          Temp(i, RY) = txtY2.Text
        Next i
          Temp(0, 0) = (Temp(1, 0) + Temp(0, 1)) / 2
          Temp(0, RY) = (Temp(0, RY - 1) + Temp(1, RY)) / 2
          Temp(RX, 0) = (Temp(RX - 1, 0) + Temp(RX, 1)) / 2
          Temp(RX, RY) = (Temp(RX, RY - 1) + Temp(RX - 1, RY)) / 2
        For i = 1 To (RX - 1)
          For j = 1 To (RY - 1)
            Temp(i, j) = (aa * (Temp(i + 1, j) + Temp(i - 1, j)) + bb * (Temp(i, j + 1) + Temp(i, j - 1)) - Constant) * (1 /
(2 * aa + 2 * bb))
          Next j
        Next i
        GS_2D_Laplace
    End If
      If optADI_E.Value = True Then
    N = 1
    R = (RX - 1) * (RY - 1)
    ReDim Temp(0 To RX, 0 To RY)
    ReDim TOld(0 To RX, 0 To RY)
    ReDim TNew(0 To RX, 0 To RY)
    ReDim bbb(1 To R)
    ReDim ccc(1 To R)
    ReDim ddd(1 To R)
    ReDim eee(1 To R)
    ReDim X(1 To R)
    ReDim beta(1 To R)
    ReDim gramma(1 To R)
    ReDim z(1 To R)
    ReDim s(1 To R)
'****BOUNDARY CONDITION********
        For i = 0 To RX
          For j = 0 To RY
            Temp(i, j) = txtInitialGuess.Text
          Next j
        Next i
        For j = 1 To RY - 1
          Temp(0, j) = txtX1.Text
          Temp(RX, j) = txtX2.Text
        Next j
        For i = 1 To RX - 1
          Temp(i, 0) = txtY1.Text
          Temp(i, RY) = txtY2.Text
        Next i
          Temp(0, 0) = (Temp(1, 0) + Temp(0, 1)) / 2
          Temp(0, RY) = (Temp(0, RY - 1) + Temp(1, RY)) / 2
          Temp(RX, 0) = (Temp(RX - 1, 0) + Temp(RX, 1)) / 2
          Temp(RX, RY) = (Temp(RX, RY - 1) + Temp(RX - 1, RY)) / 2
        ADI_2D_Laplace
    End If
End Sub
Sub GS_2D_Laplace()
        For i = 0 To (RX)
          For j = 0 To (RY)
```

```
            TOld(i, j) = Temp(i, j)
          Next j
        Next i
        For i = 1 To (RX - 1)
          For j = 1 To (RY - 1)
            Temp(i, j) = (aa * (Temp(i + 1, j) + Temp(i - 1, j)) + bb * (Temp(i, j + 1) + Temp(i, j - 1)) - Constant) * (1 /
(2 * aa + 2 * bb))
          Next j
        Next i
        For i = 0 To (RX)
          For j = 0 To (RY)
            TNew(i, j) = Temp(i, j)
          Next j
        Next i
        N = N + 1
        If txtInitialGuess.Text = 0 Then
        For j = 1 To RY - 1
          For i = 1 To RX - 1
            If Abs(TOld(i, j) - TNew(i, j)) >= 0.0000005 Then
            GS_2D_Laplace
            ElseIf Abs(TOld(i, j) - TNew(i, j)) < 0.0000005 Then
            If i = RX - 1 And j = RY - 1 Then
              pos_2D_Elliptic
            End If
          End If
          Next i
        Next j
        Else
        For j = 1 To RY - 1
          For i = 1 To RX - 1
            If Abs((TOld(i, j) - TNew(i, j)) / TNew(i, j)) >= 0.0000005 Then
              GS_2D_Laplace
            ElseIf Abs((TOld(i, j) - TNew(i, j)) / TNew(i, j)) < 0.0000005 Then
            If i = RX - 1 And j = RY - 1 Then
              pos_2D_Elliptic
            End If
          End If
          Next i
        Next j
        End If
End Sub
Sub ADI_2D_Laplace()
'******Step 1 ********
For w = 1 To R
  z(w) = w Mod (RX - 1)
  s(w) = Int(w / (RX - 1))
  If z(w) = 1 Then
    bbb(w) = Constant - bb * Temp(z(w), s(w)) - bb * Temp(z(w), s(w) + 2) - aa * Temp(z(w) - 1, s(w) + 1)
  ElseIf z(w) = 0 Then
    bbb(w) = Constant - bb * Temp((RX - 1), s(w) - 1) - bb * Temp((RX - 1), s(w) + 1) - aa * Temp((RX), s(w))
  Else
    bbb(w) = Constant - bb * Temp(z(w), s(w)) - bb * Temp(z(w), s(w) + 2)
  End If
Next w
For i = 1 To R
  If i Mod (RX - 1) = 1 Then
```

```
      ccc(i) = 0
    Else
      ccc(i) = aa
    End If
      ddd(i) = -2 * (aa + bb)
    If i Mod (RX - 1) = 0 Then
      eee(i) = 0
    Else
      eee(i) = aa
    End If
Next i
    beta(1) = ddd(1)
    gramma(1) = bbb(1) / beta(1)
For i = 2 To R
    beta(i) = ddd(i) - (ccc(i) * eee(i - 1)) / beta(i - 1)
    gramma(i) = (bbb(i) - ccc(i) * gramma(i - 1)) / beta(i)
Next i
    X(R) = gramma(R)
For i = 1 To R - 1
    X(R - i) = gramma(R - i) - (eee(R - i) * X(R - i + 1)) / beta(R - i)
Next i
For w = 1 To R
    s(w) = Int(w / (RX - 1))
    z(w) = w Mod (RX - 1)
    If z(w) = 0 Then
      Temp((RX - 1), s(w)) = X(w)
    Else
      Temp(z(w), s(w) + 1) = X(w)
    End If
Next w
For i = 1 To RX - 1
    For j = 1 To RY - 1
      TOld(i, j) = Temp(i, j)
    Next j
Next i
'*****Step2*******
For w = 1 To R
    z(w) = w Mod (RY - 1)
    s(w) = Int(w / (RY - 1))
    If z(w) = 1 Then
      bbb(w) = Constant - aa * Temp(s(w), 1) - aa * Temp(s(w) + 2, 1) - bb * Temp(s(w) + 1, 0)
    ElseIf z(w) = 0 Then
      bbb(w) = Constant - aa * Temp(s(w) - 1, RY - 1) - aa * Temp(s(w) + 1, RY - 1) - bb * Temp(s(w), RY)
    Else
      bbb(w) = Constant - aa * Temp(s(w), z(w)) - aa * Temp(s(w) + 2, z(w))
    End If
Next w
For i = 1 To R
    If i Mod (RY - 1) = 1 Then
      ccc(i) = 0
    Else
      ccc(i) = bb
    End If
      ddd(i) = -2 * (aa + bb)

    If i Mod (RY - 1) = 0 Then
```

```
      eee(i) = 0
    Else
      eee(i) = bb
    End If
  Next i
    beta(1) = ddd(1)
    gramma(1) = bbb(1) / beta(1)
  For i = 2 To R
    beta(i) = ddd(i) - (ccc(i) * eee(i - 1)) / beta(i - 1)
    gramma(i) = (bbb(i) - ccc(i) * gramma(i - 1)) / beta(i)
  Next i
    X(R) = gramma(R)
  For i = 1 To R - 1
    X(R - i) = gramma(R - i) - (eee(R - i) * X(R - i + 1)) / beta(R - i)
  Next i
  For w = 1 To R
    s(w) = Int(w / (RY - 1))
    z(w) = w Mod (RY - 1)
    If z(w) = 0 Then
      Temp(s(w), RY - 1) = X(w)
    Else
      Temp(s(w) + 1, z(w)) = X(w)
    End If
  Next w
  For i = 1 To RX - 1
      For j = 1 To RY - 1
        TNew(i, j) = Temp(i, j)
      Next j
  Next i
  N = N + 1
  If txtInitialGuess.Text = 0 Then
        For j = 1 To RY - 1
          For i = 1 To RX - 1
            If Abs(TOld(i, j) - TNew(i, j)) >= 0.0000005 Then
              ADI_2D_Laplace
            ElseIf Abs(TOld(i, j) - TNew(i, j)) < 0.0000005 Then
            If i = RX - 1 And j = RY - 1 Then
              pos_2D_Elliptic
            End If
          End If
          Next i
        Next j
        Else
        For j = 1 To RY - 1

          For i = 1 To RX - 1
            If Abs((TOld(i, j) - TNew(i, j)) / TNew(i, j)) >= 0.0000005 Then
              ADI_2D_Laplace
            ElseIf Abs((TOld(i, j) - TNew(i, j)) / TNew(i, j)) < 0.0000005 Then
            If i = RX - 1 And j = RY - 1 Then
              pos_2D_Elliptic
            End If
          End If
          Next i
        Next j
        End If
```

```
End Sub
Private Sub cmdFinish_Click()
    Form4.Enabled = False
    Form4.Hide
    CheckTextFinish
    a = Val(txtA.Text)
    b = Val(txtB.Text)
    c = Val(txtC.Text)
    DeltaX = Val(txtDeltaX.Text)
    DeltaY = Val(txtDeltaY.Text)
    DeltaZ = Val(txtDeltaZ.Text)
    Constant = Val(txtConst.Text)
    SizeX = Val(txtSizeX.Text)
    SizeY = Val(txtSizeY.Text)
    SizeZ = Val(txtSizeZ.Text)
    Gx = Val(txtGx.Text)
    Gy = Val(txtGy.Text)
    Gz = Val(txtGz.Text)
    RX = SizeX / DeltaX
    RY = SizeY / DeltaY
    RZ = SizeZ / DeltaZ
    aa = a / DeltaX ^ 2
    bb = b / DeltaY ^ 2
    cc = c / DeltaZ ^ 2
    If optGauss.Value = True Then
    ReDim Temp(0 To RX, 0 To RY, 0 To RZ)
    ReDim TOld(0 To RX, 0 To RY, 0 To RZ)
    ReDim TNew(0 To RX, 0 To RY, 0 To RZ)
    ReDim TF(0 To RX / Gx, 0 To RY / Gy, 0 To RZ / Gz)
    N = 1
    For i = 0 To RX
      For j = 0 To RY
        For k = 0 To RZ
          Temp(i, j, k) = txtInitialGuess.Text
        Next k
      Next j
    Next i
    For j = 1 To RY - 1
      For k = 0 To RZ
        Temp(0, j, k) = txtX1.Text
        Temp(RX, j, k) = txtX2.Text
      Next k
    Next j
    For i = 1 To RX - 1
      For k = 0 To RZ
        Temp(i, 0, k) = txtY1.Text
        Temp(i, RY, k) = txtY2.Text
      Next k
    Next i
    For k = 0 To RZ
      Temp(0, 0, k) = (Temp(1, 0, k) + Temp(0, 1, k)) / 2
      Temp(0, RY, k) = (Temp(0, RY - 1, k) + Temp(1, RY, k)) / 2
      Temp(RX, 0, k) = (Temp(RX - 1, 0, k) + Temp(RX, 1, k)) / 2
      Temp(RX, RY, k) = (Temp(RX, RY - 1, k) + Temp(RX - 1, RY, k)) / 2
    Next
    For i = 0 To RX
```

```
        For j = 0 To RY
        Temp(i, j, 0) = txtZ1.Text
        Temp(i, j, RZ) = txtZ2.Text
        Next j
      Next i
      For i = 1 To (RX - 1)
        For j = 1 To (RY - 1)
          For k = 1 To (RZ - 1)
            Temp(i, j, k) = (aa * (Temp(i + 1, j, k) + Temp(i - 1, j, k)) + bb * (Temp(i, j + 1, k) + Temp(i, j - 1, k)) + cc *
(Temp(i, j, k + 1) + Temp(i, j, k - 1)) - Constant) * (1 / (2 * aa + 2 * bb + 2 * cc))
          Next k
        Next j
      Next i
      GS_3D_Laplace
    End If
    If optADI_E.Value = True Then
R = (RX - 1) * (RY - 1) * (RZ - 1)
ReDim Temp(0 To RX, 0 To RY, 0 To RZ)
ReDim TOld(0 To RX, 0 To RY, 0 To RZ)
ReDim TNew(0 To RX, 0 To RY, 0 To RZ)
ReDim bbb(1 To R)
ReDim ccc(1 To R)
ReDim ddd(1 To R)
ReDim eee(1 To R)
ReDim xxx(1 To R)
ReDim beta(1 To R)
ReDim gramma(1 To R)
ReDim H(1 To R)
ReDim UU(1 To R)
ReDim VV(1 To R)
'****BOUNDARY CONDITION********
For k = 0 To RZ
  For j = 0 To RY
    For i = 0 To RX
      Temp(i, j, k) = txtInitialGuess.Text
    Next i
  Next j
Next k
For k = 0 To RZ
  For j = 1 To RY - 1
    Temp(0, j, k) = txtX1.Text
    Temp(RX, j, k) = txtX2.Text
  Next j
Next k
For k = 0 To RZ
  For i = 1 To RX - 1
    Temp(i, 0, k) = txtY1.Text
    Temp(i, RY, k) = txtY2.Text
  Next i
Next k
    For k = 0 To RZ
      Temp(0, 0, k) = (Temp(1, 0, k) + Temp(0, 1, k)) / 2
      Temp(0, RY, k) = (Temp(0, RY - 1, k) + Temp(1, RY, k)) / 2
      Temp(RX, 0, k) = (Temp(RX - 1, 0, k) + Temp(RX, 1, k)) / 2
      Temp(RX, RY, k) = (Temp(RX, RY - 1, k) + Temp(RX - 1, RY, k)) / 2
    Next
```

```
For j = 0 To RY
   For i = 0 To RX
      Temp(i, j, 0) = txtZ1.Text
      Temp(i, j, RZ) = txtZ2.Text
   Next i
Next j
ADI_3D_Laplace
End If
End Sub
Sub GS_3D_Laplace()
      For i = 0 To (RX)
         For j = 0 To (RY)
            For k = 0 To (RZ)
               TOld(i, j, k) = Temp(i, j, k)
            Next k
         Next j
      Next i
      For i = 1 To (RX - 1)
         For j = 1 To (RY - 1)
            For k = 1 To (RZ - 1)
               Temp(i, j, k) = (aa * (Temp(i + 1, j, k) + Temp(i - 1, j, k)) + bb * (Temp(i, j + 1, k) + Temp(i, j - 1, k)) + cc *
(Temp(i, j, k + 1) + Temp(i, j, k - 1)) - Constant) * (1 / (2 * aa + 2 * bb + 2 * cc))
            Next k
         Next j
      Next i
     For i = 0 To (RX)
         For j = 0 To (RY)
             For k = 0 To (RZ)
            TNew(i, j, k) = Temp(i, j, k)
            Next k
         Next j
      Next i
      N = N + 1
      If txtInitialGuess.Text = 0 Then
         For i = 1 To RX - 1
            For j = 1 To RY - 1
               For k = 1 To RZ - 1
                  If Abs(TOld(i, j, k) - TNew(i, j, k)) >= 0.0000005 Then
                     GS_3D_Laplace
                  ElseIf Abs(TOld(i, j, k) - TNew(i, j, k)) < 0.0000005 Then
                     If i = RX - 1 And j = RY - 1 And k = RZ - 1 Then
                        Pos_3D_Elliptic
                     End If
                  End If
               Next k
            Next j
         Next i
      Else
         For i = 1 To RX - 1
            For j = 1 To RY - 1
               For k = 1 To RZ - 1
                  If Abs((TOld(i, j, k) - TNew(i, j, k)) / TNew(i, j, k)) >= 0.0000005 Then
                     GS_3D_Laplace
                  ElseIf Abs((TOld(i, j, k) - TNew(i, j, k)) / TNew(i, j, k)) < 0.0000005 Then
                     If i = RX - 1 And j = RY - 1 And k = RZ - 1 Then
                        Pos_3D_Elliptic
```

```
                End If
            End If
        Next k
    Next j
  Next i
 End If
End Sub
Sub ADI_3D_Laplace()
'******Step 1 ********
For w = 1 To R
  H(w) = Int(w / ((RX - 1) * (RY - 1)))
  UU(w) = w Mod (RX - 1)
  VV(w) = Int(w / (RX - 1)) Mod (RY - 1)
  If UU(w) = 1 Then
    bbb(w) = Constant - bb * Temp(UU(w), VV(w), H(w) + 1) - bb * Temp(UU(w), VV(w) + 2, H(w) + 1) - cc * Temp
(UU(w), VV(w) + 1, H(w)) - cc * Temp(UU(w), VV(w) + 1, H(w) + 2) - aa * Temp(UU(w) - 1, VV(w) + 1, H(w) + 1)
  ElseIf UU(w) = 0 And VV(w) = 0 Then
    bbb(w) = Constant - bb * Temp(RX - 1, RY - 2, H(w)) - bb * Temp(RX - 1, RY, H(w)) - cc * Temp(RX - 1, RY - 1, H
(w) - 1) - cc * Temp(RX - 1, RY - 1, H(w) + 1) - aa * Temp(RX, RY - 1, H(w))
  ElseIf UU(w) = 0 Then
    bbb(w) = Constant - bb * Temp(RX - 1, VV(w) - 1, H(w) + 1) - bb * Temp(RX - 1, VV(w) + 1, H(w) + 1) - cc *
Temp(RX - 1, VV(w), H(w)) - cc * Temp(RX - 1, VV(w), H(w) + 2) - aa * Temp(RX, VV(w), H(w) + 1)
  Else
    bbb(w) = Constant - bb * Temp(UU(w), VV(w), H(w) + 1) - bb * Temp(UU(w), VV(w) + 2, H(w) + 1) - cc * Temp
(UU(w), VV(w) + 1, H(w)) - cc * Temp(UU(w), VV(w) + 1, H(w) + 2)
  End If
Next w
For i = 1 To R
  If i Mod (RX - 1) = 1 Then
    ccc(i) = 0
  Else
    ccc(i) = 1
  End If
    ddd(i) = -6

  If i Mod (RX - 1) = 0 Then
    eee(i) = 0
  Else
    eee(i) = 1
  End If
Next i
  beta(1) = ddd(1)
  gramma(1) = bbb(1) / beta(1)
For i = 2 To R
  beta(i) = ddd(i) - (ccc(i) * eee(i - 1)) / beta(i - 1)
  gramma(i) = (bbb(i) - ccc(i) * gramma(i - 1)) / beta(i)
Next i
  xxx(R) = gramma(R)
For i = 1 To R - 1
  xxx(R - i) = gramma(R - i) - (eee(R - i) * xxx(R - i + 1)) / beta(R - i)
Next i
For w = 1 To R
  H(w) = Int(w / ((RX - 1) * (RY - 1)))
  UU(w) = w Mod (RX - 1)
  VV(w) = Int(w / (RX - 1)) Mod (RY - 1)
  If UU(w) = 0 And VV(w) = 0 Then
```

```
      Temp(RX - 1, RY - 1, H(w)) = xxx(w)
   ElseIf UU(w) = 0 Then
      Temp(RX - 1, VV(w), H(w) + 1) = xxx(w)
   Else
      Temp(UU(w), VV(w) + 1, H(w) + 1) = xxx(w)
   End If
Next w
For k = 1 To RZ - 1
   For j = 1 To RY - 1
      For i = 1 To RX - 1
         TOld(i, j, k) = Temp(i, j, k)
      Next i
   Next j
Next k
'**********step2**********
For w = 1 To R
   H(w) = Int(w / ((RY - 1) * (RZ - 1)))
   UU(w) = w Mod (RY - 1)
   VV(w) = Int(w / (RY - 1)) Mod (RZ - 1)
   If UU(w) = 1 Then
      bbb(w) = Constant - cc * Temp(H(w) + 1, UU(w), VV(w)) - cc * Temp(H(w) + 1, UU(w), VV(w) + 2) - aa * Temp(H
(w), UU(w), VV(w) + 1) - aa * Temp(H(w) + 2, UU(w), VV(w) + 1) - bb * Temp(H(w) + 1, UU(w) - 1, VV(w) + 1)
   ElseIf UU(w) = 0 And VV(w) = 0 Then
      bbb(w) = Constant - cc * Temp(H(w), RY - 1, RZ - 2) - cc * Temp(H(w), RY - 1, RZ) - aa * Temp(H(w) - 1, RY - 1,
RZ - 1) - aa * Temp(H(w) + 1, RY - 1, RZ - 1) - bb * Temp(H(w), RY, RZ - 1)
   ElseIf UU(w) = 0 Then
      bbb(w) = Constant - cc * Temp(H(w) + 1, RY - 1, VV(w) - 1) - cc * Temp(H(w) + 1, RY - 1, VV(w) + 1) - aa *
Temp(H(w), RY - 1, VV(w)) - aa * Temp(H(w) + 2, RY - 1, VV(w)) - bb * Temp(H(w) + 1, RY, VV(w))
   Else
      bbb(w) = Constant - cc * Temp(H(w) + 1, UU(w), VV(w)) - cc * Temp(H(w) + 1, UU(w), VV(w) + 2) - aa * Temp(H
(w), UU(w), VV(w) + 1) - aa * Temp(H(w) + 2, UU(w), VV(w) + 1)
   End If
Next w
For i = 1 To R
   If i Mod (RY - 1) = 1 Then
      ccc(i) = 0
   Else
      ccc(i) = 1
   End If
      ddd(i) = -6
   If i Mod (RY - 1) = 0 Then
      eee(i) = 0
   Else
      eee(i) = 1
   End If
Next i
   beta(1) = ddd(1)
   gramma(1) = bbb(1) / beta(1)
For i = 2 To R
   beta(i) = ddd(i) - (ccc(i) * eee(i - 1)) / beta(i - 1)
   gramma(i) = (bbb(i) - ccc(i) * gramma(i - 1)) / beta(i)
Next i
   xxx(R) = gramma(R)
For i = 1 To R - 1
   xxx(R - i) = gramma(R - i) - (eee(R - i) * xxx(R - i + 1)) / beta(R - i)
Next i
```

```
For w = 1 To R
   H(w) = Int(w / ((RY - 1) * (RZ - 1)))
   UU(w) = w Mod (RY - 1)
   VV(w) = Int(w / (RY - 1)) Mod (RZ - 1)
   If UU(w) = 0 And VV(w) = 0 Then
      Temp(H(w), RY - 1, RZ - 1) = xxx(w)
   ElseIf UU(w) = 0 Then
      Temp(H(w) + 1, RY - 1, VV(w)) = xxx(w)
   Else
      Temp(H(w) + 1, UU(w), VV(w) + 1) = xxx(w)
   End If
Next w
'*****************step3******************
For w = 1 To R
   H(w) = Int(w / ((RZ - 1) * (RX - 1)))
   UU(w) = w Mod (RZ - 1)
   VV(w) = Int(w / (RZ - 1)) Mod (RX - 1)
   If UU(w) = 1 Then
      bbb(w) = Constant - aa * Temp(VV(w), H(w) + 1, UU(w)) - aa * Temp(VV(w) + 2, H(w) + 1, UU(w)) - bb * Temp
(VV(w) + 1, H(w), UU(w)) - bb * Temp(VV(w) + 1, H(w) + 2, UU(w)) - cc * Temp(VV(w) + 1, H(w) + 1, UU(w) - 1)
   ElseIf UU(w) = 0 And VV(w) = 0 Then
      bbb(w) = Constant - aa * Temp(RX - 2, H(w), RZ - 1) - aa * Temp(RX, H(w), RZ - 1) - bb * Temp(RX - 1, H(w) - 1,
RZ - 1) - bb * Temp(RX - 1, H(w) + 1, RZ - 1) - cc * Temp(RX - 1, H(w), RZ)
   ElseIf UU(w) = 0 Then
      bbb(w) = Constant - aa * Temp(VV(w) - 1, H(w) + 1, RZ - 1) - aa * Temp(VV(w) + 1, H(w) + 1, RZ - 1) - bb *
Temp(VV(w), H(w), RZ - 1) - bb * Temp(VV(w), H(w) + 2, RZ - 1) - cc * Temp(VV(w), H(w) + 1, RZ)
   Else
      bbb(w) = Constant - aa * Temp(VV(w), H(w) + 1, UU(w)) - aa * Temp(VV(w) + 2, H(w) + 1, UU(w)) - bb * Temp
(VV(w) + 1, H(w), UU(w)) - bb * Temp(VV(w) + 1, H(w) + 2, UU(w))
   End If
Next w
For i = 1 To R
   If i Mod (RZ - 1) = 1 Then
      ccc(i) = 0
   Else
      ccc(i) = 1
   End If
      ddd(i) = -6

   If i Mod (RZ - 1) = 0 Then
      eee(i) = 0
   Else
      eee(i) = 1
   End If
Next i
   beta(1) = ddd(1)
   gramma(1) = bbb(1) / beta(1)
For i = 2 To R
   beta(i) = ddd(i) - (ccc(i) * eee(i - 1)) / beta(i - 1)
   gramma(i) = (bbb(i) - ccc(i) * gramma(i - 1)) / beta(i)
Next i
   xxx(R) = gramma(R)
For i = 1 To R - 1
   xxx(R - i) = gramma(R - i) - (eee(R - i) * xxx(R - i + 1)) / beta(R - i)
Next i
For w = 1 To R
```

```
    H(w) = Int(w / ((RZ - 1) * (RX - 1)))
    UU(w) = w Mod (RZ - 1)
    VV(w) = Int(w / (RZ - 1)) Mod (RX - 1)
    If UU(w) = 0 And VV(w) = 0 Then
       Temp(RX - 1, H(w), RZ - 1) = xxx(w)
    ElseIf UU(w) = 0 Then
       Temp(VV(w), H(w) + 1, RZ - 1) = xxx(w)
    Else
       Temp(VV(w) + 1, H(w) + 1, UU(w)) = xxx(w)
    End If
  Next w
  For k = 1 To RZ - 1
    For i = 1 To RX - 1
      For j = 1 To RY - 1
        TNew(i, j, k) = Temp(i, j, k)
      Next j
    Next i
  Next k
     N = N + 1
      If txtInitialGuess.Text = 0 Then
        For j = 1 To RY - 1
          For i = 1 To RX - 1
            For k = 1 To RZ - 1
              If Abs(TOld(i, j, k) - TNew(i, j, k)) >= 0.0000005 Then
                 ADI_3D_Laplace

              ElseIf Abs(TOld(i, j, k) - TNew(i, j, k)) < 0.0000005 Then
                 If i = RX - 1 And j = RY - 1 And k = RZ - 1 Then
                    'MsgBox ("No. of Iteration =" & N)
                    Pos_3D_Elliptic
                 End If
              End If
            Next k
          Next i
        Next j
        Else
        For j = 1 To RY - 1
          For i = 1 To RX - 1
            For k = 1 To RZ - 1
              If Abs((TOld(i, j, k) - TNew(i, j, k)) / TNew(i, j, k)) >= 0.0000005 Then
                 ADI_3D_Laplace
              ElseIf Abs((TOld(i, j, k) - TNew(i, j, k)) / TNew(i, j, k)) < 0.0000005 Then
                 If i = RX - 1 And j = RY - 1 And k = RZ - 1 Then
                    'MsgBox ("No. of Iteration =" & N)
                    Pos_3D_Elliptic
                 End If
              End If
            Next k
          Next i
        Next j
        End If
End Sub
Private Sub cmdFinish_Click()
      Form5.Enabled = False
      Form5.Hide
      CheckTextFinish
```

```
        a = Val(txtA.Text)
        DeltaX = Val(txtDeltaX.Text)
        DeltaT = Val(txtDeltaT.Text)
        SizeX = Val(txtSizeX.Text)
        Gx = Val(txtGx.Text)
        Gt = Val(txtGt.Text)
        Tmax = Val(txtTMax.Text)
        RX = SizeX / DeltaX
        RT = Tmax / DeltaT
        F = a * DeltaT / (DeltaX) ^ 2
        ReDim Temp(0 To RX, 0 To RT)
        ReDim TF(0 To RX / Gx, 0 To RT / Gt)
        For j = 1 To RT
          Temp(0, j) = Val(txtX1.Text)
          Temp(RX, j) = Val(txtX2.Text)
        Next j
        For i = 0 To RX
          Temp(i, 0) = Val(txtTzero.Text)
        Next i
        If optImplicit.Value = True Then
ReDim bbb(1 To RX - 1)
ReDim ccc(1 To RX - 1)
ReDim ddd(1 To RX - 1)
ReDim eee(1 To RX - 1)
ReDim xxx(1 To RX - 1)
ReDim beta(1 To RX - 1)
ReDim gramma(1 To RX - 1)
'***********Step1***********
For j = 1 To RT
For i = 1 To RX - 1
  If i = 1 Then
    bbb(i) = Temp(i, j - 1) + F * Temp(i - 1, j)
  ElseIf i = RX - 1 Then
    bbb(i) = Temp(i, j - 1) + F * Temp(i + 1, j)
  Else
    bbb(i) = Temp(i, j - 1)
  End If
Next i
For i = 1 To RX - 1
  If i = 1 Then
    ccc(i) = 0
  Else
    ccc(i) = -F
  End If

  ddd(i) = 1 + 2 * F

  If i = RX - 1 Then
    eee(i) = 0
  Else
    eee(i) = -F
  End If
Next i
  beta(1) = ddd(1)
  gramma(1) = bbb(1) / beta(1)
For i = 2 To RX - 1
```

```
    beta(i) = ddd(i) - (ccc(i) * eee(i - 1)) / beta(i - 1)
    gramma(i) = (bbb(i) - ccc(i) * gramma(i - 1)) / beta(i)
Next i
    xxx(RX - 1) = gramma(RX - 1)
For i = 1 To RX - 2
    xxx(RX - 1 - i) = gramma(RX - 1 - i) - (eee(RX - 1 - i) * xxx(RX - 1 - i + 1)) / beta(RX - 1 - i)
Next i
For i = 1 To RX - 1
    Temp(i, j) = xxx(i)
Next i
Next j
pos_1D_Parabolic
        End If
        If optMOL.Value = True Then
        ReDim b(1 To RX - 1, 1 To 4, 0 To RT)
For j = 0 To RT - 1
    For i = 1 To RX - 1
        b(i, 1, j) = ((Temp(i - 1, j) - (2 * Temp(i, j)) + Temp(i + 1, j)) / DeltaX ^ 2) * a
    Next i
    For i = 1 To RX - 1
        If i = 1 Then
        b(i, 2, j) = ((Temp(i - 1, j) - (2 * (Temp(i, j) + (1 / 2) * DeltaT * b(i, 1, j))) + (Temp(i + 1, j) + (1 / 2) * DeltaT * b(i +
1, 1, j))) / DeltaX ^ 2) * a
        ElseIf i = RX - 1 Then
        b(i, 2, j) = (((Temp(i - 1, j) + (1 / 2) * DeltaT * b(i - 1, 1, j)) - (2 * (Temp(i, j) + (1 / 2) * DeltaT * b(i, 1, j))) + Temp(i
+ 1, j)) / DeltaX ^ 2) * a
        Else
        b(i, 2, j) = (((Temp(i - 1, j) + (1 / 2) * DeltaT * b(i - 1, 1, j)) - (2 * (Temp(i, j) + (1 / 2) * DeltaT * b(i, 1, j))) + (Temp(i
+ 1, j) + (1 / 2) * DeltaT * b(i + 1, 1, j))) / DeltaX ^ 2) * a
        End If
    Next i
    For i = 1 To RX - 1
        If i = 1 Then
        b(i, 3, j) = ((Temp(i - 1, j) - (2 * (Temp(i, j) + (1 / 2) * DeltaT * b(i, 2, j))) + (Temp(i + 1, j) + (1 / 2) * DeltaT * b(i +
1, 2, j))) / DeltaX ^ 2) * a
        ElseIf i = RX - 1 Then
        b(i, 3, j) = (((Temp(i - 1, j) + (1 / 2) * DeltaT * b(i - 1, 2, j)) - (2 * (Temp(i, j) + (1 / 2) * DeltaT * b(i, 2, j))) + Temp(i
+ 1, j)) / DeltaX ^ 2) * a
        Else
        b(i, 3, j) = (((Temp(i - 1, j) + (1 / 2) * DeltaT * b(i - 1, 2, j)) - (2 * (Temp(i, j) + (1 / 2) * DeltaT * b(i, 2, j))) + (Temp(i
+ 1, j) + (1 / 2) * DeltaT * b(i + 1, 2, j))) / DeltaX ^ 2) * a
        End If
    Next i
    For i = 1 To RX - 1
        If i = 1 Then
        b(i, 4, j) = ((Temp(i - 1, j) - (2 * (Temp(i, j) + DeltaT * b(i, 3, j))) + (Temp(i + 1, j) + DeltaT * b(i + 1, 3, j))) / DeltaX
^ 2) * a
        ElseIf i = RX - 1 Then
        b(i, 4, j) = (((Temp(i - 1, j) + DeltaT * b(i - 1, 3, j)) - (2 * (Temp(i, j) + DeltaT * b(i, 3, j))) + Temp(i + 1, j)) / DeltaX
^ 2) * a
        Else
        b(i, 4, j) = (((Temp(i - 1, j) + DeltaT * b(i - 1, 3, j)) - (2 * (Temp(i, j) + DeltaT * b(i, 3, j))) + (Temp(i + 1, j) + DeltaT
* b(i + 1, 3, j))) / DeltaX ^ 2) * a
        End If
    Next i
    For i = 1 To RX - 1
```

```
        Temp(i, j + 1) = Temp(i, j) + DeltaT / 6 * (b(i, 1, j) + 2 * b(i, 2, j) + 2 * b(i, 3, j) + b(i, 4, j))
    Next i
Next j
    pos_1D_Parabolic
        End If
        txtTzero.Text = ""
        txtX1.Text = ""
        txtX2.Text = ""
        Frame3.Visible = False
        txtA.Text = ""
        txtTMax.Text = ""
        txtDeltaX.Text = ""
        txtDeltaT.Text = ""
        txtSizeX.Text = ""
        txtGx.Text = ""
        txtGt.Text = ""
        cmdNext2.Visible = True
        Form5.Hide
        Form1.Show
End Sub
Private Sub cmdFinish_Click()
        Form6.Enabled = False
        Form6.Hide
        CheckTextFinish
        a = Val(txtA.Text)
        b = Val(txtB.Text)
        DeltaX = Val(txtDeltaX.Text)
        DeltaY = Val(txtDeltaY.Text)
        DeltaT = Val(txtDeltaT.Text)
        SizeX = Val(txtSizeX.Text)
        SizeY = Val(txtSizeY.Text)
        Gx = Val(txtGx.Text)
        Gy = Val(txtGy.Text)
        Gt = Val(txtGt.Text)
        RX = SizeX / DeltaX
        RY = SizeY / DeltaY
        Tmax = Val(txtTMax.Text)
        RT = Tmax / DeltaT
        aa = a * DeltaT / (DeltaX) ^ 2
        bb = b * DeltaT / (DeltaY) ^ 2
        ReDim TNew(0 To RX, 0 To RY, 0 To RT)
        ReDim TF(0 To RX / Gx, 0 To RY / Gy, 0 To RT / Gt)
        ReDim Temp(0 To RX, 0 To RY)
        ReDim Tstar(1 To RX - 1, 1 To RY - 1)
        For k = 0 To 0
            For i = 0 To RX
                For j = 0 To RY
                    TNew(i, j, k) = txtTzero.Text
                Next j
            Next i
        Next k
        For i = 0 To RX
            For j = 0 To RY
                Temp(i, j) = txtTzero.Text
            Next j
        Next i
```

```
For j = 0 To RY
   Temp(0, j) = txtX1.Text
   Temp(RX, j) = txtX2.Text
Next j
For i = 0 To RX
   Temp(i, 0) = txtY1.Text
   Temp(i, RY) = txtY2.Text
Next i
For k = 1 To RT
'**************** Step 1 ******************
ReDim bbb(1 To RX - 1)
ReDim ccc(2 To RX - 1)
ReDim ddd(1 To RX - 1)
ReDim eee(1 To RX - 2)
ReDim xxx(1 To RX - 1)
ReDim beta(1 To RX - 1)
ReDim gramma(1 To RX - 1)
For j = 1 To RY - 1
      For i = 1 To RX - 1
         If i = RX - 1 Then
            bbb(i) = -bb * Temp(i, j - 1) + (2 * bb - 2) * Temp(i, j) - bb * Temp(i, j + 1) - aa * Temp(i + 1, j)
          ElseIf i = 1 Then
            bbb(i) = -bb * Temp(i, j - 1) + (2 * bb - 2) * Temp(i, j) - bb * Temp(i, j + 1) - aa * Temp(i - 1, j)
          Else
            bbb(i) = -bb * Temp(i, j - 1) + (2 * bb - 2) * Temp(i, j) - bb * Temp(i, j + 1)
         End If
      Next i
For i = 2 To RX - 1
   ccc(i) = aa
Next i
For i = 1 To RX - 1
   ddd(i) = -(2 * aa + 2)
Next i
For i = 1 To RX - 2
   eee(i) = aa
Next i
beta(1) = ddd(1)
gramma(1) = bbb(1) / beta(1)
For i = 2 To RX - 1
   beta(i) = ddd(i) - (ccc(i) * eee(i - 1)) / beta(i - 1)
   gramma(i) = (bbb(i) - ccc(i) * gramma(i - 1)) / beta(i)
Next i
   xxx(RX - 1) = gramma(RX - 1)
For i = 1 To RX - 2
   xxx(RX - 1 - i) = gramma(RX - 1 - i) - (eee(RX - 1 - i) * xxx(RX - 1 - i + 1)) / beta(RX - 1 - i)
Next i
For i = 1 To RX - 1
   Tstar(i, j) = xxx(i)
Next i
Next j
'**************** step 2 ****************
ReDim bbb(1 To RY - 1)
ReDim ccc(2 To RY - 1)
ReDim ddd(1 To RY - 1)
ReDim eee(1 To RY - 2)
ReDim xxx(1 To RY - 1)
```

```
ReDim beta(1 To RY - 1)
ReDim gramma(1 To RY - 1)
For i = 1 To RX - 1
  If i = 1 Then
    For j = 1 To RY - 1
      If j = 1 Then
        bbb(j) = -aa * Temp(i - 1, j) + (2 * aa - 2) * Tstar(i, j) - aa * Tstar(i + 1, j) - bb * Temp(i, j - 1)
      ElseIf j = RY - 1 Then
        bbb(j) = -aa * Temp(i - 1, j) + (2 * aa - 2) * Tstar(i, j) - aa * Tstar(i + 1, j) - bb * Temp(i, j + 1)
      Else
        bbb(j) = -aa * Temp(i - 1, j) + (2 * aa - 2) * Tstar(i, j) - aa * Tstar(i + 1, j)
      End If
    Next j
  ElseIf i = RX - 1 Then
    For j = 1 To RY - 1
      If j = 1 Then
        bbb(j) = -aa * Tstar(i - 1, j) + (2 * aa - 2) * Tstar(i, j) - aa * Temp(i + 1, j) - bb * Temp(i, j - 1)
      ElseIf j = RY - 1 Then
        bbb(j) = -aa * Tstar(i - 1, j) + (2 * aa - 2) * Tstar(i, j) - aa * Temp(i + 1, j) - bb * Temp(i, j + 1)
      Else
        bbb(j) = -aa * Tstar(i - 1, j) + (2 * aa - 2) * Tstar(i, j) - aa * Temp(i + 1, j)
      End If
    Next j
  Else
    For j = 1 To RY - 1
      If j = 1 Then
        bbb(j) = -aa * Tstar(i - 1, j) + (2 * aa - 2) * Tstar(i, j) - aa * Tstar(i + 1, j) - bb * Temp(i, j - 1)
      ElseIf j = RY - 1 Then
        bbb(j) = -aa * Tstar(i - 1, j) + (2 * aa - 2) * Tstar(i, j) - aa * Tstar(i + 1, j) - bb * Temp(i, j + 1)
      Else
        bbb(j) = -aa * Tstar(i - 1, j) + (2 * aa - 2) * Tstar(i, j) - aa * Tstar(i + 1, j)
      End If
    Next j
  End If
For j = 2 To RY - 1
  ccc(j) = bb
Next j
For j = 1 To RY - 1
  ddd(j) = -(2 * bb + 2)
Next j
For j = 1 To RY - 2
  eee(j) = bb
Next j
beta(1) = ddd(1)
gramma(1) = bbb(1) / beta(1)
For j = 2 To RY - 1
  beta(j) = ddd(j) - (ccc(j) * eee(j - 1)) / beta(j - 1)
  gramma(j) = (bbb(j) - ccc(j) * gramma(j - 1)) / beta(j)
Next j
  xxx(RY - 1) = gramma(RY - 1)
For j = 1 To RY - 2
  xxx(RY - 1 - j) = gramma(RY - 1 - j) - (eee(RY - 1 - j) * xxx(RY - 1 - j + 1)) / beta(RY - 1 - j)
Next j
For j = 1 To RY - 1
  Temp(i, j) = xxx(j)
Next j
```

```
            Temp(0, 0) = (Temp(1, 0) + Temp(0, 1)) / 2
            Temp(0, RY) = (Temp(0, RY - 1) + Temp(1, RY)) / 2
            Temp(RX, 0) = (Temp(RX - 1, 0) + Temp(RX, 1)) / 2
            Temp(RX, RY) = (Temp(RX, RY - 1) + Temp(RX - 1, RY)) / 2
        Next i
        For j = 0 To RY
            For i = 0 To RX
                TNew(i, j, k) = Temp(i, j)
            Next i
        Next j
        Next k
    pos_2D_parabolic
        txtTzero.Text = ""
        txtX1.Text = ""
        txtX2.Text = ""
        txtY1.Text = ""
        txtY2.Text = ""
        Frame3.Visible = False
        txtA.Text = ""
        txtB.Text = ""
        txtTMax.Text = ""
        txtDeltaX.Text = ""
        txtDeltaY.Text = ""
        txtDeltaT.Text = ""
        txtSizeX.Text = ""
        txtSizeY.Text = ""
        txtGx.Text = ""
        txtGy.Text = ""
        txtGt.Text = ""
        cmdNext2.Visible = True
        Form6.Hide
        Form1.Show
End Sub
Sub Pos_1D_Elliptic()
    Set xlSheet1 = xlBook.Sheets(1)
    xlSheet1.Activate
    Cells.Select
    Selection.ClearContents
    With Selection
        .WrapText = False
        .Orientation = 0
        .ShrinkToFit = False
        .MergeCells = False
    End With
    With Selection.Font
        .Name = "Cordia New"
        .FontStyle = "Regular"
        .Size = 14
        .Strikethrough = False
        .Superscript = False
        .Subscript = False
        .OutlineFont = False
        .Shadow = False
        .Underline = xlUnderlineStyleNone
        .ColorIndex = xlAutomatic
    End With
```

```
Columns("A:HM").Select
Selection.ColumnWidth = 7.5
Range("B1:K1").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
ActiveCell.FormulaR1C1 = "Elliptic Equation"
Range("E2:H3").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlCenter
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = True
End With
Range("E2:H3").Select
ActiveCell.FormulaR1C1 = "a(ñ2T/ñx2) = Const"
With ActiveCell.Characters(Start:=1, Length:=2).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=3, Length:=1).Font
    .Name = "Symbol"
    .FontStyle = "Regular"
    .Size = 16
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
```

```
End With
With ActiveCell.Characters(Start:=4, Length:=1).Font
    .Name = "Symbol"
    .FontStyle = "Regular"
    .Size = 16
    .Strikethrough = False
    .Superscript = True
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=5, Length:=3).Font
    .Name = "Symbol"
    .FontStyle = "Regular"
    .Size = 16
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=8, Length:=1).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=9, Length:=1).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = True
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=10, Length:=4).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
```

```
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=14, Length:=5).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 16
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
Range("E5:E9").Select
With Selection
    .HorizontalAlignment = xlRight
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Range("E5").Select
ActiveCell.FormulaR1C1 = "a ="
Range("E6").Select
ActiveCell.FormulaR1C1 = "Const ="
Range("E7").Select
ActiveCell.FormulaR1C1 = "deltaX ="
Range("E8").Select
ActiveCell.FormulaR1C1 = "Length of X = "
Range("E9").Select
ActiveCell.FormulaR1C1 = "Frequency of X = "
Range("F5").Select
ActiveCell.FormulaR1C1 = a
Range("F6").Select
ActiveCell.FormulaR1C1 = Constant
Range("F7").Select
ActiveCell.FormulaR1C1 = DeltaX
Range("F8").Select
ActiveCell.FormulaR1C1 = SizeX
Range("F9").Select
ActiveCell.FormulaR1C1 = Gx
Range("F5:F9").Select
With Selection
    .HorizontalAlignment = xlLeft
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .IndentLevel = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
```

```
Range("I5:K5").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
ActiveCell.FormulaR1C1 = "Boundary Condition"
Range("I6:J6").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
Range("I7:J7").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
Range("I8:J8").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
Range("I6:J8").Select
With Selection
    .HorizontalAlignment = xlRight
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
End With
Range("I6:J6").Select
ActiveCell.FormulaR1C1 = "Initial Guess T ="
Range("I7:J7").Select
ActiveCell.FormulaR1C1 = "x="
Range("I7:J7").Select
ActiveCell.FormulaR1C1 = "x = 0       T ="
Range("I8:J8").Select
```

```
ActiveCell.FormulaR1C1 = "x = " & SizeX & "      T ="
Range("K6:K8").Select
With Selection
    .HorizontalAlignment = xlLeft
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .IndentLevel = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Range("K6").Select
ActiveCell.FormulaR1C1 = Val(txtInitialGuess.Text)
Range("K7").Select
ActiveCell.FormulaR1C1 = Val(txtX1.Text)
Range("K8").Select
ActiveCell.FormulaR1C1 = Val(txtX2.Text)
Range("B11:K11").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
ActiveCell.FormulaR1C1 = "Numerical Result by using Gauss Seidel Method"
Range("B12:" & GetOne((RX / Gx) + 1) & "12").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
ActiveCell.FormulaR1C1 = "x"
Range("B13:CC500").Select
Selection.NumberFormat = "0.####"
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Range("B14:" & GetOne((RX / Gx) + 1) & "14").Select
Selection.Borders(xlDiagonalDown).LineStyle = xlNone
Selection.Borders(xlDiagonalUp).LineStyle = xlNone
With Selection.Borders(xlEdgeLeft)
    .LineStyle = xlContinuous
    .Weight = xlMedium
    .ColorIndex = xlAutomatic
```

```
    End With
    With Selection.Borders(xlEdgeTop)
      .LineStyle = xlContinuous
      .Weight = xlMedium
      .ColorIndex = xlAutomatic
    End With
    With Selection.Borders(xlEdgeBottom)
      .LineStyle = xlContinuous
      .Weight = xlMedium
      .ColorIndex = xlAutomatic
    End With
    With Selection.Borders(xlEdgeRight)
      .LineStyle = xlContinuous
      .Weight = xlMedium
      .ColorIndex = xlAutomatic
    End With
    Selection.Borders(xlInsideVertical).LineStyle = xlNone
      GG = RX / Gx
      ReDim TF(0 To GG)
      For i = 0 To GG
        xlSheet1.Cells(13, i + 2).Value = i * DeltaX * Gx
        TF(i) = Temp(i * Gx)
        xlSheet1.Cells(14, i + 2).Value = TF(i)
      Next i
        Range("A1").Select
      txtInitialGuess.Text = ""
      txtX1.Text = ""
      txtX2.Text = ""
      Frame3.Visible = False
      txtA.Text = ""
      txtConst.Text = ""
      txtDeltaX.Text = ""
      txtSizeX.Text = ""
      txtGx.Text = ""
      cmdNext2.Visible = True
      Form2.Hide
      Form1.Show
        End
End Sub
Sub pos_2D_Elliptic()
    Set xlSheet1 = xlBook.Sheets(2)
    xlSheet1.Activate
    Cells.Select
    Selection.ClearContents
    With Selection
      .WrapText = False
      .Orientation = 0
      .ShrinkToFit = False
      .MergeCells = False
    End With
    With Selection.Font
      .Name = "Cordia New"
      .FontStyle = "Regular"
      .Size = 14
      .Strikethrough = False
      .Superscript = False
```

```
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
Columns("A:GZ").Select
Selection.ColumnWidth = 7.5
Rows("1:796").Select
Selection.RowHeight = 21.75
Range("B1:M1").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
ActiveCell.FormulaR1C1 = "Elliptic Equation"
Range("E2:J3").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlCenter
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = True
End With
With Selection.Font
    .Name = "Cordia New"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
Range("E2:J3").Select
ActiveCell.FormulaR1C1 = "a(∩2T/∩x2) + b(∩2T/∩y2) = Const"
With ActiveCell.Characters(Start:=1, Length:=2).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
```

```
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=3, Length:=1).Font
    .Name = "Symbol"
    .FontStyle = "Regular"
    .Size = 16
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=4, Length:=1).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = True
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=5, Length:=2).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=7, Length:=1).Font
    .Name = "Symbol"
    .FontStyle = "Regular"
    .Size = 16
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
```

```
With ActiveCell.Characters(Start:=8, Length:=1).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=9, Length:=1).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = True
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=10, Length:=6).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=16, Length:=1).Font
    .Name = "Symbol"
    .FontStyle = "Regular"
    .Size = 16
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=17, Length:=1).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = True
    .Subscript = False
    .OutlineFont = False
```

```
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=18, Length:=2).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=20, Length:=1).Font
    .Name = "Symbol"
    .FontStyle = "Regular"
    .Size = 16
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=21, Length:=1).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=22, Length:=1).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = True
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=23, Length:=4).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
```

```
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=27, Length:=5).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 16
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
Range("D5:D13").Select
With Selection
    .HorizontalAlignment = xlRight
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Range("E5:E13").Select
With Selection
    .HorizontalAlignment = xlLeft
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .IndentLevel = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Range("D5").Select
ActiveCell.FormulaR1C1 = "a ="
Range("D6").Select
ActiveCell.FormulaR1C1 = "b ="
Range("D7").Select
ActiveCell.FormulaR1C1 = "Const ="
Range("D8").Select
ActiveCell.FormulaR1C1 = "deltaX ="
Range("D9").Select
ActiveCell.FormulaR1C1 = "deltaY ="
Range("D10").Select
ActiveCell.FormulaR1C1 = "Length of X ="
Range("D11").Select
ActiveCell.FormulaR1C1 = "Length of Y ="
Range("D12").Select
ActiveCell.FormulaR1C1 = "Frequency of X ="
Range("D13").Select
```

```
ActiveCell.FormulaR1C1 = "Frequency of Y ="
Range("E5").Select
ActiveCell.FormulaR1C1 = a
Range("E6").Select
ActiveCell.FormulaR1C1 = b
Range("E7").Select
ActiveCell.FormulaR1C1 = Constant
Range("E8").Select
ActiveCell.FormulaR1C1 = DeltaX
Range("E9").Select
ActiveCell.FormulaR1C1 = DeltaY
Range("E10").Select
ActiveCell.FormulaR1C1 = SizeX
Range("E11").Select
ActiveCell.FormulaR1C1 = SizeY
Range("E12").Select
ActiveCell.FormulaR1C1 = Gx
Range("E13").Select
ActiveCell.FormulaR1C1 = Gy
Range("H5:J5").Select
With Selection
   .HorizontalAlignment = xlCenter
   .VerticalAlignment = xlBottom
   .WrapText = False
   .Orientation = 0
   .ShrinkToFit = False
   .MergeCells = False
End With
Selection.Merge
ActiveCell.FormulaR1C1 = "Boundary Condition"
Range("H6:I6").Select
With Selection
   .HorizontalAlignment = xlCenter
   .VerticalAlignment = xlBottom
   .WrapText = False
   .Orientation = 0
   .ShrinkToFit = False
   .MergeCells = False
End With
Selection.Merge
With Selection
   .HorizontalAlignment = xlRight
   .VerticalAlignment = xlBottom
   .WrapText = False
   .Orientation = 0
   .ShrinkToFit = False
   .MergeCells = True
End With
Range("H7:I7").Select
With Selection
   .HorizontalAlignment = xlCenter
   .VerticalAlignment = xlBottom
   .WrapText = False
   .Orientation = 0
   .ShrinkToFit = False
   .MergeCells = False
```

```
End With
Selection.Merge
With Selection
    .HorizontalAlignment = xlRight
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = True
End With
Range("H8:I8").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
With Selection
    .HorizontalAlignment = xlRight
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = True
End With
Range("H9:I9").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
With Selection
    .HorizontalAlignment = xlRight
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = True
End With
Range("H10:I10").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
```

```
With Selection
    .HorizontalAlignment = xlRight
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = True
End With
Range("J6:J10").Select
With Selection
    .HorizontalAlignment = xlLeft
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .IndentLevel = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Range("H6:I6").Select
ActiveCell.FormulaR1C1 = "Initial Guess T ="
Range("H7:I7").Select
ActiveCell.FormulaR1C1 = "x = 0      T ="
Range("H8:I8").Select
ActiveCell.FormulaR1C1 = "x = " & SizeX & "      T ="
Range("H9:I9").Select
ActiveCell.FormulaR1C1 = "y = 0      T ="
Range("H10:I10").Select
ActiveCell.FormulaR1C1 = "y = " & SizeY & "      T ="
Range("J6").Select
ActiveCell.FormulaR1C1 = Val(txtInitialGuess.Text)
Range("J7").Select
ActiveCell.FormulaR1C1 = Val(txtX1.Text)
Range("J8").Select
ActiveCell.FormulaR1C1 = Val(txtX2.Text)
Range("J9").Select
ActiveCell.FormulaR1C1 = Val(txtY1.Text)
Range("J10").Select
ActiveCell.FormulaR1C1 = Val(txtY2.Text)
Range("B15:M15").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
If optGauss.Value = True Then
Range("B15:M15").Select
ActiveCell.FormulaR1C1 = "Numerical Result by using Gauss Seidel Method"
ElseIf optADI_E.Value = True Then
Range("B15:M15").Select
ActiveCell.FormulaR1C1 = "Numerical Result by using Alternating Direction Implicit Method"
End If
Range("C16:" & GetOne((RX / Gx) + 2) & "16").Select
```

```
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
ActiveCell.FormulaR1C1 = "x"
Range("A18:A" & CStr(18 + (RY / Gy))).Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlCenter
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = True
End With
ActiveCell.FormulaR1C1 = "y"
Range("B17:GX2000").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.NumberFormat = "0.####"
Range("C" & CStr(16 + (RY / Gy) + 4) & ":" & GetOne((RX / Gx) + 2) & CStr(16 + (RY / Gy) + 4)).Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
ActiveCell.FormulaR1C1 = "x"
Range(GetOne((RX / Gx) + 4) & "18:" & GetOne((RX / Gx) + 4) & CStr(18 + (RY / Gy))).Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
```

```
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
  End With
  Selection.Merge
  With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlCenter
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = True
  End With
  ActiveCell.FormulaR1C1 = "y"
  ReDim TF(0 To RX / Gx, 0 To RY / Gy)
  For i = 0 To (RX / Gx)
    xlSheet1.Cells(17, i + 3).Value = i * DeltaX * Gx
  Next i
    For i = 0 To (RX / Gx)
    xlSheet1.Cells(17 + (RY / Gy) + 2, i + 3).Value = i * DeltaX * Gx
  Next i
  For j = 0 To (RY / Gy)
    xlSheet1.Cells(j + 18, 2).Value = j * DeltaY * Gy
  Next j
  For j = 0 To (RY / Gy)
    xlSheet1.Cells(j + 18, 2 + (RX / Gx) + 2).Value = j * DeltaY * Gy
  Next j
  For i = 0 To (RX / Gx)
    For j = 0 To (RY / Gy)
      TF(i, j) = Temp(i * Gx, j * Gy)
    Next j
  Next i
  For i = 0 To (RX / Gx)
    For j = 0 To (RY / Gy)
      xlSheet1.Cells(j + 18, i + 3).Value = TF(i, j)
    Next j
  Next i
  Range("C18:" & GetLastXY((RX / Gx) + 2, RY / Gy + 16)).Select
  Selection.Borders(xlDiagonalDown).LineStyle = xlNone
  Selection.Borders(xlDiagonalUp).LineStyle = xlNone
  With Selection.Borders(xlEdgeLeft)
    .LineStyle = xlContinuous
    .Weight = xlMedium
    .ColorIndex = xlAutomatic
  End With
  With Selection.Borders(xlEdgeTop)
    .LineStyle = xlContinuous
    .Weight = xlMedium
    .ColorIndex = xlAutomatic
  End With
  With Selection.Borders(xlEdgeBottom)
    .LineStyle = xlContinuous
    .Weight = xlMedium
    .ColorIndex = xlAutomatic
  End With
  With Selection.Borders(xlEdgeRight)
```

```
        .LineStyle = xlContinuous
        .Weight = xlMedium
        .ColorIndex = xlAutomatic
    End With
    Selection.Borders(xlInsideVertical).LineStyle = xlNone
    Selection.Borders(xlInsideHorizontal).LineStyle = xlNone
    Range("A1").Select
      txtInitialGuess.Text = ""
      txtX1.Text = ""
      txtX2.Text = ""
      txtY1.Text = ""
      txtY2.Text = ""
      Frame3.Visible = False
      txtA.Text = ""
      txtB.Text = ""
      txtConst.Text = ""
      txtDeltaX.Text = ""
      txtDeltaY.Text = ""
      txtSizeX.Text = ""
      txtSizeY.Text = ""
      txtGx.Text = ""
      txtGy.Text = ""
      cmdNext2.Visible = True
      Form3.Hide
      Form1.Show
    End
End Sub
Sub Pos_3D_Elliptic()
  Set xlSheet1 = xlBook.Sheets(3)
    xlSheet1.Activate
    Cells.Select
    Selection.ClearContents
    With Selection
      .WrapText = False
      .Orientation = 0
      .ShrinkToFit = False
      .MergeCells = False
    End With
    With Selection.Font
      .Name = "Cordia New"
      .FontStyle = "Regular"
      .Size = 14
      .Strikethrough = False
      .Superscript = False
      .Subscript = False
      .OutlineFont = False
      .Shadow = False
      .Underline = xlUnderlineStyleNone
      .ColorIndex = xlAutomatic
    End With
    Columns("A:FA").Select
    Selection.ColumnWidth = 7.5
    Rows("1:258").Select
    Selection.RowHeight = 21.75
    Range("B1:M1").Select
    With Selection
```

```
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
ActiveCell.FormulaR1C1 = "Elliptic Equation"
Range("C2:L3").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlCenter
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = True
End With
With Selection.Font
    .Name = "Cordia New"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
ActiveCell.FormulaR1C1 = "a(∩2T/∩x2) + b(∩2T/∩y2) + c(∩2T/∩z2) = Const"
With ActiveCell.Characters(Start:=1, Length:=2).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=3, Length:=1).Font
    .Name = "Symbol"
    .FontStyle = "Regular"
    .Size = 16
    .Strikethrough = False
```

```
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=4, Length:=1).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = True
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=5, Length:=2).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=7, Length:=1).Font
    .Name = "Symbol"
    .FontStyle = "Regular"
    .Size = 16
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=8, Length:=1).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=9, Length:=1).Font
```

```
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = True
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=10, Length:=6).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=16, Length:=1).Font
    .Name = "Symbol"
    .FontStyle = "Regular"
    .Size = 16
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=17, Length:=1).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = True
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=18, Length:=2).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
```

```
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
  End With
  With ActiveCell.Characters(Start:=20, Length:=1).Font
    .Name = "Symbol"
    .FontStyle = "Regular"
    .Size = 16
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
  End With
  With ActiveCell.Characters(Start:=21, Length:=1).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
  End With
  With ActiveCell.Characters(Start:=22, Length:=1).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = True
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
  End With
  With ActiveCell.Characters(Start:=23, Length:=6).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
  End With
  With ActiveCell.Characters(Start:=29, Length:=1).Font
    .Name = "Symbol"
    .FontStyle = "Regular"
    .Size = 16
    .Strikethrough = False
```

```
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=30, Length:=1).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = True
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=31, Length:=2).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=33, Length:=1).Font
    .Name = "Symbol"
    .FontStyle = "Regular"
    .Size = 16
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=34, Length:=1).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=35, Length:=1).Font
```

```
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = True
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
  End With
  With ActiveCell.Characters(Start:=36, Length:=4).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
  End With
  With ActiveCell.Characters(Start:=40, Length:=5).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 16
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
  End With
  Range("D5:D17").Select
  With Selection
    .HorizontalAlignment = xlRight
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
  End With
  Range("E5:E17").Select
  With Selection
    .HorizontalAlignment = xlLeft
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .IndentLevel = 0
    .ShrinkToFit = False
    .MergeCells = False
  End With
  Range("D5").Select
  ActiveCell.FormulaR1C1 = "a ="
```

```
Range("D6").Select
ActiveCell.FormulaR1C1 = "b ="
Range("D7").Select
ActiveCell.FormulaR1C1 = "c ="
Range("D8").Select
ActiveCell.FormulaR1C1 = "Const ="
Range("D9").Select
ActiveCell.FormulaR1C1 = "deltaX ="
Range("D10").Select
ActiveCell.FormulaR1C1 = "deltaY ="
Range("D11").Select
ActiveCell.FormulaR1C1 = "deltaZ ="
Range("D12").Select
ActiveCell.FormulaR1C1 = "Length of X ="
Range("D13").Select
ActiveCell.FormulaR1C1 = "Length of Y ="
Range("D14").Select
ActiveCell.FormulaR1C1 = "Length of Z ="
Range("D15").Select
ActiveCell.FormulaR1C1 = "Frequency of X ="
Range("D16").Select
ActiveCell.FormulaR1C1 = "Frequency of Y ="
Range("D17").Select
ActiveCell.FormulaR1C1 = "Frequency of Z ="
Range("E5").Select
ActiveCell.FormulaR1C1 = a
Range("E6").Select
ActiveCell.FormulaR1C1 = b
Range("E7").Select
ActiveCell.FormulaR1C1 = c
Range("E8").Select
ActiveCell.FormulaR1C1 = Constant
Range("E9").Select
ActiveCell.FormulaR1C1 = DeltaX
Range("E10").Select
ActiveCell.FormulaR1C1 = DeltaY
Range("E11").Select
ActiveCell.FormulaR1C1 = DeltaZ
Range("E12").Select
ActiveCell.FormulaR1C1 = SizeX
Range("E13").Select
ActiveCell.FormulaR1C1 = SizeY
Range("E14").Select
ActiveCell.FormulaR1C1 = SizeZ
Range("E15").Select
ActiveCell.FormulaR1C1 = Gx
Range("E16").Select
ActiveCell.FormulaR1C1 = Gy
Range("E17").Select
ActiveCell.FormulaR1C1 = Gz
Range("H5:J5").Select
With Selection
   .HorizontalAlignment = xlCenter
   .VerticalAlignment = xlBottom
   .WrapText = False
   .Orientation = 0
```

```
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
ActiveCell.FormulaR1C1 = "Boundary Condition"
Range("H6:I6").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
With Selection
    .HorizontalAlignment = xlRight
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = True
End With
Range("H7:I7").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
With Selection
    .HorizontalAlignment = xlRight
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = True
End With
Range("H8:I8").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
With Selection
    .HorizontalAlignment = xlRight
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
```

```
    .ShrinkToFit = False
    .MergeCells = True
End With
Range("H9:I9").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
With Selection
    .HorizontalAlignment = xlRight
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = True
End With
Range("H10:I10").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
With Selection
    .HorizontalAlignment = xlRight
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = True
End With
Range("H11:I11").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
With Selection
    .HorizontalAlignment = xlRight
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = True
```

```
End With
Range("H12:I12").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
With Selection
    .HorizontalAlignment = xlRight
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = True
End With
Range("J6:J12").Select
With Selection
    .HorizontalAlignment = xlLeft
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .IndentLevel = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Range("H6:I6").Select
ActiveCell.FormulaR1C1 = "Initial Guess T ="
Range("H7:I7").Select
ActiveCell.FormulaR1C1 = "x = 0      T ="
Range("H8:I8").Select
ActiveCell.FormulaR1C1 = "x = " & SizeX & "     T ="
Range("H9:I9").Select
ActiveCell.FormulaR1C1 = "y = 0      T ="
Range("H10:I10").Select
ActiveCell.FormulaR1C1 = "y = " & SizeY & "     T ="
Range("H11:I11").Select
ActiveCell.FormulaR1C1 = "z = 0      T ="
Range("H12:I12").Select
ActiveCell.FormulaR1C1 = "z = " & SizeZ & "     T ="
Range("J6").Select
ActiveCell.FormulaR1C1 = Val(txtInitialGuess.Text)
Range("J7").Select
ActiveCell.FormulaR1C1 = Val(txtX1.Text)
Range("J8").Select
ActiveCell.FormulaR1C1 = Val(txtX2.Text)
Range("J9").Select
ActiveCell.FormulaR1C1 = Val(txtY1.Text)
Range("J10").Select
ActiveCell.FormulaR1C1 = Val(txtY2.Text)
Range("J11").Select
ActiveCell.FormulaR1C1 = Val(txtZ1.Text)
Range("J12").Select
```

```
    ActiveCell.FormulaR1C1 = Val(txtZ2.Text)
    Range("B19:M19").Select
    With Selection
      .HorizontalAlignment = xlCenter
      .VerticalAlignment = xlBottom
      .WrapText = False
      .Orientation = 0
      .ShrinkToFit = False
      .MergeCells = False
    End With
    Selection.Merge
    If optGauss.Value = True Then
    Range("B19:M19").Select
    ActiveCell.FormulaR1C1 = "Numerical Result by using Gauss Seidel Method"
    ElseIf optADI_E.Value = True Then
    Range("B19:M19").Select
    ActiveCell.FormulaR1C1 = "Numerical Result by using Alternating Direction Implicit Method"
    End If
    Range("B22:CC2000").Select
    Selection.NumberFormat = "0.####"
    With Selection
      .HorizontalAlignment = xlCenter
      .VerticalAlignment = xlBottom
      .WrapText = False
      .Orientation = 0
      .ShrinkToFit = False
      .MergeCells = False
    End With
    For k = 0 To RZ / Gz
      Range("B" & k * ((RY / Gy) + 6) + 20 & ":D" & k * ((RY / Gy) + 6) + 20).Select
    With Selection
      .HorizontalAlignment = xlCenter
      .VerticalAlignment = xlBottom
      .WrapText = False
      .Orientation = 0
      .ShrinkToFit = False
      .MergeCells = True
    End With
    ActiveCell.FormulaR1C1 = "z = " & k * DeltaZ * Gz
    Next k
    For k = 0 To RZ / Gz
    Range("C" & k * ((RY / Gy) + 6) + 21 & ":" & GetOne((RX / Gx) + 2) & k * ((RY / Gy) + 6) + 21).Select
    With Selection
      .HorizontalAlignment = xlCenter
      .VerticalAlignment = xlBottom
      .WrapText = False
      .Orientation = 0
      .ShrinkToFit = False
      .MergeCells = True
    End With
    ActiveCell.FormulaR1C1 = "x"
    Range("C" & k * ((RY / Gy) + 6) + 21 + (RY / Gy) + 4 & ":" & GetOne((RX / Gx) + 2) & k * ((RY / Gy) + 6) + 21 + (RY
/ Gy) + 4).Select
    With Selection
      .HorizontalAlignment = xlCenter
      .VerticalAlignment = xlBottom
```

```
        .WrapText = False
        .Orientation = 0
        .ShrinkToFit = False
        .MergeCells = True
    End With
    ActiveCell.FormulaR1C1 = "x"
    Next k
  For k = 0 To RZ / Gz
      For i = 0 To RX / Gx
        xlSheet1.Cells(k * ((RY / Gy) + 6) + 22, i + 3).Value = i * DeltaX * Gx
      Next i
    Next k
  For k = 0 To RZ / Gz
      For i = 0 To RX / Gx
        xlSheet1.Cells(k * ((RY / Gy) + 6) + 22 + (RY / Gy) + 2, i + 3).Value = i * DeltaX * Gx
      Next i
    Next k
  For k = 0 To RZ / Gz
      Range("A" & k * ((RY / Gy) + 6) + 23 & ":A" & k * ((RY / Gy) + 6) + 23 + (RY / Gy)).Select
    With Selection
      .HorizontalAlignment = xlCenter
      .VerticalAlignment = xlBottom
      .WrapText = False
      .Orientation = 0
      .ShrinkToFit = False
      .MergeCells = False
    End With
    Selection.Merge
    With Selection
      .HorizontalAlignment = xlCenter
      .VerticalAlignment = xlCenter
      .WrapText = False
      .Orientation = 0
      .ShrinkToFit = False
      .MergeCells = True
    End With
    ActiveCell.FormulaR1C1 = "y"
  Next k
  For k = 0 To RZ / Gz
    Range(GetOne((RX / Gx) + 4) & k * ((RY / Gy) + 6) + 23 & ":" & GetOne((RX / Gx) + 4) & k * ((RY / Gy) + 6) + 23 +
  (RY / Gy)).Select

    With Selection
      .HorizontalAlignment = xlCenter
      .VerticalAlignment = xlBottom
      .WrapText = False
      .Orientation = 0
      .ShrinkToFit = False
      .MergeCells = False
    End With
    Selection.Merge
    With Selection
      .HorizontalAlignment = xlCenter
      .VerticalAlignment = xlCenter
      .WrapText = False
      .Orientation = 0
```

```
        .ShrinkToFit = False
        .MergeCells = True
    End With
    ActiveCell.FormulaR1C1 = "y"
    Next k
    For k = 0 To RZ / Gz
      For j = 0 To RY / Gy
          xlSheet1.Cells(k * ((RY / Gy) + 6) + j + 23, 2).Value = j * DeltaY * Gy
      Next j
    Next k
    For k = 0 To RZ / Gz
      For j = 0 To RY / Gy
          xlSheet1.Cells(k * ((RY / Gy) + 6) + j + 23, 2 + (RX / Gx) + 2).Value = j * DeltaY * Gy
      Next j
    Next k
    ReDim TF(0 To RX / Gx, 0 To RY / Gy, 0 To RZ / Gz)
    For k = 0 To RZ / Gz
      For j = 0 To RY / Gy
        For i = 0 To RX / Gx
          TF(i, j, k) = Temp(i * Gx, j * Gy, k * Gz)
          xlSheet1.Cells(k * ((RY / Gy) + 6) + j + 23, i + 3) = TF(i, j, k)
        Next i
      Next j
    Next k
    For k = 0 To RZ / Gz
Range("C" & k * ((RY / Gy) + 6) + 23 & ":" & GetOne((RX / Gx) + 2) & k * ((RY / Gy) + 6) + 21 + (RY / Gy) + 2).Select
    Selection.Borders(xlDiagonalDown).LineStyle = xlNone
    Selection.Borders(xlDiagonalUp).LineStyle = xlNone
    With Selection.Borders(xlEdgeLeft)
      .LineStyle = xlContinuous
      .Weight = xlMedium
      .ColorIndex = xlAutomatic
    End With
    With Selection.Borders(xlEdgeTop)
      .LineStyle = xlContinuous
      .Weight = xlMedium
      .ColorIndex = xlAutomatic
    End With
    With Selection.Borders(xlEdgeBottom)
      .LineStyle = xlContinuous
      .Weight = xlMedium
      .ColorIndex = xlAutomatic
    End With
    With Selection.Borders(xlEdgeRight)
      .LineStyle = xlContinuous
      .Weight = xlMedium
      .ColorIndex = xlAutomatic
    End With
    Selection.Borders(xlInsideVertical).LineStyle = xlNone
    Selection.Borders(xlInsideHorizontal).LineStyle = xlNone
    Next k
      Range("A1").Select
      txtInitialGuess.Text = ""
      txtX1.Text = ""
      txtX2.Text = ""
      txtY1.Text = ""
```

```
        txtY2.Text = ""
        txtZ1.Text = ""
        Frame3.Visible = False
        txtA.Text = ""
        txtB.Text = ""
        txtC.Text = ""
        txtConst.Text = ""
        txtDeltaX.Text = ""
        txtDeltaY.Text = ""
        txtDeltaZ.Text = ""
        txtSizeX.Text = ""
        txtSizeY.Text = ""
        txtSizeZ.Text = ""
        txtGx.Text = ""
        txtGy.Text = ""
        txtGz.Text = ""
        cmdNext2.Visible = True
        Form4.Hide
        Form1.Show
    End
End Sub
Sub pos_1D_Parabolic()
    Set xlSheet1 = xlBook.Sheets(4)
    xlSheet1.Activate
    Cells.Select
    Selection.ClearContents
    With Selection
        .WrapText = False
        .Orientation = 0
        .ShrinkToFit = False
        .MergeCells = False
    End With
    With Selection.Font
        .Name = "Cordia New"
        .FontStyle = "Regular"
        .Size = 14
        .Strikethrough = False
        .Superscript = False
        .Subscript = False
        .OutlineFont = False
        .Shadow = False
        .Underline = xlUnderlineStyleNone
        .ColorIndex = xlAutomatic
    End With
    Columns("A:ED").Select
    Selection.ColumnWidth = 7.5
    Rows("1:1052").Select
    Selection.RowHeight = 21.75
    Range("B1:M1").Select
    With Selection
        .HorizontalAlignment = xlCenter
        .VerticalAlignment = xlBottom
        .WrapText = False
        .Orientation = 0
        .ShrinkToFit = False
        .MergeCells = False
```

```
End With
Selection.Merge
ActiveCell.FormulaR1C1 = "Parabolic Equation"
Range("F2:I3").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
Range("F2:I3").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlCenter
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = True
End With
With Selection.Font
    .Name = "Cordia New"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
ActiveCell.FormulaR1C1 = "a(ฏ2T/ฏx2) = (ฏT/ฏt)"
With ActiveCell.Characters(Start:=1, Length:=2).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=3, Length:=1).Font
    .Name = "Symbol"
    .FontStyle = "Regular"
    .Size = 16
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
```

```
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=4, Length:=1).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = True
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=5, Length:=2).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=7, Length:=1).Font
    .Name = "Symbol"
    .FontStyle = "Regular"
    .Size = 16
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=8, Length:=1).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=9, Length:=1).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = True
```

```
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=10, Length:=5).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=15, Length:=1).Font
    .Name = "Symbol"
    .FontStyle = "Regular"
    .Size = 16
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=16, Length:=2).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=18, Length:=1).Font
    .Name = "Symbol"
    .FontStyle = "Regular"
    .Size = 16
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=19, Length:=2).Font
    .Name = "Cordia New"
```

```
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
Range("E5:E11").Select
With Selection
    .HorizontalAlignment = xlRight
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Range("F5:F11").Select
With Selection
    .HorizontalAlignment = xlLeft
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .IndentLevel = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Range("E5").Select
ActiveCell.FormulaR1C1 = "a ="
Range("E6").Select
ActiveCell.FormulaR1C1 = "deltaX = "
Range("E7").Select
ActiveCell.FormulaR1C1 = "Length of X ="
Range("E8").Select
ActiveCell.FormulaR1C1 = "deltaT ="
Range("E9").Select
ActiveCell.FormulaR1C1 = "Maximum Time ="
Range("E10").Select
ActiveCell.FormulaR1C1 = "Frequency of X ="
Range("E11").Select
ActiveCell.FormulaR1C1 = "Frequency of Y ="
Range("F5").Select
ActiveCell.FormulaR1C1 = a
Range("F6").Select
ActiveCell.FormulaR1C1 = DeltaX
Range("F7").Select
ActiveCell.FormulaR1C1 = SizeX
Range("F8").Select
ActiveCell.FormulaR1C1 = DeltaT
Range("F9").Select
ActiveCell.FormulaR1C1 = Tmax
Range("F10").Select
ActiveCell.FormulaR1C1 = Gx
Range("F11").Select
```

```
ActiveCell.FormulaR1C1 = Gt
Range("I5:K5").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
ActiveCell.FormulaR1C1 = "Initial Condition"
Range("I6:J6").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
With Selection
    .HorizontalAlignment = xlRight
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = True
End With
Range("K6").Select
With Selection
    .HorizontalAlignment = xlLeft
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .IndentLevel = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Range("I6:J6").Select
ActiveCell.FormulaR1C1 = "Time = 0    T ="
Range("K6").Select
ActiveCell.FormulaR1C1 = Val(txtTzero.Text)
Range("I7:K7").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
ActiveCell.FormulaR1C1 = "Boundary Condition"
Range("I8:J8").Select
```

```
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
With Selection
    .HorizontalAlignment = xlRight
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = True
End With
Range("I9:J9").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
With Selection
    .HorizontalAlignment = xlRight
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = True
End With
Range("K8").Select
ActiveCell.FormulaR1C1 = ""
Range("K8").Select
With Selection
    .HorizontalAlignment = xlLeft
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .IndentLevel = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Range("K9").Select
With Selection
    .HorizontalAlignment = xlLeft
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .IndentLevel = 0
    .ShrinkToFit = False
    .MergeCells = False
```

```
End With
Range("I8:J8").Select
ActiveCell.FormulaR1C1 = "x = 0      T ="
Range("I9:J9").Select
ActiveCell.FormulaR1C1 = "x = " & SizeX & "     T ="
Range("K8").Select
ActiveCell.FormulaR1C1 = Val(txtX1.Text)
Range("K9").Select
ActiveCell.FormulaR1C1 = Val(txtX2.Text)
Range("B13:M13").Select
With Selection
   .HorizontalAlignment = xlCenter
   .VerticalAlignment = xlBottom
   .WrapText = False
   .Orientation = 0
   .ShrinkToFit = False
   .MergeCells = False
End With
Selection.Merge
If optImplicit.Value = True Then
Range("B13:M13").Select
ActiveCell.FormulaR1C1 = "Numerical Result by using Implicit Method"
ElseIf optMOL.Value = True Then
Range("B13:M13").Select
ActiveCell.FormulaR1C1 = "Numerical Result by using Method of lines"
End If
Range("C14:" & GetOne((RX / Gx) + 2) & "14").Select
With Selection
   .HorizontalAlignment = xlCenter
   .VerticalAlignment = xlBottom
   .WrapText = False
   .Orientation = 0
   .ShrinkToFit = False
   .MergeCells = False
End With
Selection.Merge
ActiveCell.FormulaR1C1 = "x"
Range("A16:A" & CStr(16 + (RT / Gt))).Select
With Selection
   .HorizontalAlignment = xlCenter
   .VerticalAlignment = xlBottom
   .WrapText = False
   .Orientation = 0
   .ShrinkToFit = False
   .MergeCells = False
End With
Selection.Merge
With Selection
   .HorizontalAlignment = xlCenter
   .VerticalAlignment = xlCenter
   .WrapText = False
   .Orientation = 0
   .ShrinkToFit = False
   .MergeCells = True
End With
ActiveCell.FormulaR1C1 = "Time"
```

```
    Range("B15:CC2000").Select
    With Selection
        .HorizontalAlignment = xlCenter
        .VerticalAlignment = xlBottom
        .WrapText = False
        .Orientation = 0
        .ShrinkToFit = False
        .MergeCells = False
    End With
    Selection.NumberFormat = "0.####"
Range("C" & CStr(14 + (RT / Gt) + 4) & ":" & GetOne((RX / Gx) + 2) & CStr(14 + (RT / Gt) + 4)).Select
    With Selection
        .HorizontalAlignment = xlCenter
        .VerticalAlignment = xlBottom
        .WrapText = False
        .Orientation = 0
        .ShrinkToFit = False
        .MergeCells = False
    End With
    Selection.Merge
    ActiveCell.FormulaR1C1 = "x"
Range(GetOne((RX / Gx) + 4) & "16:" & GetOne((RX / Gx) + 4) & CStr(16 + (RT / Gt))).Select
With Selection
        .HorizontalAlignment = xlCenter
        .VerticalAlignment = xlBottom
        .WrapText = False
        .Orientation = 0
        .ShrinkToFit = False
        .MergeCells = False
    End With
    Selection.Merge
    With Selection
        .HorizontalAlignment = xlCenter
        .VerticalAlignment = xlCenter
        .WrapText = False
        .Orientation = 0
        .ShrinkToFit = False
        .MergeCells = True
    End With
    ActiveCell.FormulaR1C1 = "Time"
    For i = 0 To (RX / Gx)
        xlSheet1.Cells(15, i + 3).Value = i * DeltaX * Gx
    Next i
    For i = 0 To (RX / Gx)
        xlSheet1.Cells(15 + (RT / Gt) + 2, i + 3).Value = i * DeltaX * Gx
    Next i
    For j = 0 To (RT / Gt)
        xlSheet1.Cells(j + 16, 2).Value = j * DeltaT * Gt
    Next j
    For j = 0 To (RT / Gt)
        xlSheet1.Cells(j + 16, 2 + (RX / Gx) + 2).Value = j * DeltaT * Gt
    Next j
    For i = 0 To (RX / Gx)
        For j = 0 To (RT / Gt)
            TF(i, j) = Temp(i * Gx, j * Gt)
            xlSheet1.Cells(j + 16, i + 3).Value = TF(i, j)
```

```
        Next j
    Next i
    Range("C16:" & GetLastXY((RX / Gx) + 2, RT / Gt + 14)).Select
    Selection.Borders(xlDiagonalDown).LineStyle = xlNone
    Selection.Borders(xlDiagonalUp).LineStyle = xlNone
    With Selection.Borders(xlEdgeLeft)
        .LineStyle = xlContinuous
        .Weight = xlMedium
        .ColorIndex = xlAutomatic
    End With
    With Selection.Borders(xlEdgeTop)
        .LineStyle = xlContinuous
        .Weight = xlMedium
        .ColorIndex = xlAutomatic
    End With
    With Selection.Borders(xlEdgeBottom)
        .LineStyle = xlContinuous
        .Weight = xlMedium
        .ColorIndex = xlAutomatic
    End With
    With Selection.Borders(xlEdgeRight)
        .LineStyle = xlContinuous
        .Weight = xlMedium
        .ColorIndex = xlAutomatic
    End With
    Selection.Borders(xlInsideVertical).LineStyle = xlNone
    Selection.Borders(xlInsideHorizontal).LineStyle = xlNone
    Range("A1").Select
    End
End Sub
Sub pos_2D_parabolic()
Set xlSheet1 = xlBook.Worksheets(5)
xlSheet1.Activate
    Cells.Select
    Selection.ClearContents
    With Selection
        .WrapText = False
        .Orientation = 0
        .ShrinkToFit = False
        .MergeCells = False
    End With
    With Selection.Font
        .Name = "Cordia New"
        .FontStyle = "Regular"
        .Size = 14
        .Strikethrough = False
        .Superscript = False
        .Subscript = False
        .OutlineFont = False
        .Shadow = False
        .Underline = xlUnderlineStyleNone
        .ColorIndex = xlAutomatic
    End With
    Columns("A:FI").Select
    Selection.ColumnWidth = 7.5
    Rows("1:1017").Select
```

```
Selection.RowHeight = 21.75
Range("B1:M1").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
ActiveCell.FormulaR1C1 = "Parabolic Equation"
Range("D2:K3").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlCenter
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = True
End With
With Selection.Font
    .Name = "Cordia New"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
ActiveCell.FormulaR1C1 = "a(∏2T/∏x2) + b(∏2T/∏y2) = (∏T/∏t)"
With ActiveCell.Characters(Start:=1, Length:=2).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
End With
With ActiveCell.Characters(Start:=3, Length:=1).Font
    .Name = "Symbol"
```

```
    .FontStyle = "Regular"
    .Size = 16
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
  End With
  With ActiveCell.Characters(Start:=4, Length:=1).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = True
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
  End With
  With ActiveCell.Characters(Start:=5, Length:=2).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
  End With
  With ActiveCell.Characters(Start:=7, Length:=1).Font
    .Name = "Symbol"
    .FontStyle = "Regular"
    .Size = 16
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
  End With
  With ActiveCell.Characters(Start:=8, Length:=1).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
```

```
    .ColorIndex = xlAutomatic
  End With
  With ActiveCell.Characters(Start:=9, Length:=1).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = True
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
  End With
  With ActiveCell.Characters(Start:=10, Length:=6).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
  End With
  With ActiveCell.Characters(Start:=16, Length:=1).Font
    .Name = "Symbol"
    .FontStyle = "Regular"
    .Size = 16
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
  End With
  With ActiveCell.Characters(Start:=17, Length:=1).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = True
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
  End With
  With ActiveCell.Characters(Start:=18, Length:=2).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
```

```
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
  End With
  With ActiveCell.Characters(Start:=20, Length:=1).Font
    .Name = "Symbol"
    .FontStyle = "Regular"
    .Size = 16
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
  End With
  With ActiveCell.Characters(Start:=21, Length:=1).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
  End With
  With ActiveCell.Characters(Start:=22, Length:=1).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = True
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
  End With
  With ActiveCell.Characters(Start:=23, Length:=5).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
  End With
  With ActiveCell.Characters(Start:=28, Length:=1).Font
    .Name = "Symbol"
```

```
    .FontStyle = "Regular"
    .Size = 16
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
  End With
  With ActiveCell.Characters(Start:=29, Length:=2).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
  End With
  With ActiveCell.Characters(Start:=31, Length:=1).Font
    .Name = "Symbol"
    .FontStyle = "Regular"
    .Size = 16
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
  End With
  With ActiveCell.Characters(Start:=32, Length:=2).Font
    .Name = "Cordia New"
    .FontStyle = "Regular"
    .Size = 22
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
  End With
  Range("D5:D15").Select
  With Selection
    .HorizontalAlignment = xlRight
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
  End With
  Range("E5:E15").Select
```

```
With Selection
    .HorizontalAlignment = xlLeft
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .IndentLevel = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Range("D5").Select
ActiveCell.FormulaR1C1 = "a ="
Range("D6").Select
ActiveCell.FormulaR1C1 = "b ="
Range("D7").Select
ActiveCell.FormulaR1C1 = "deltaX ="
Range("D8").Select
ActiveCell.FormulaR1C1 = "deltaY ="
Range("D9").Select
ActiveCell.FormulaR1C1 = "Length of X ="
Range("D10").Select
ActiveCell.FormulaR1C1 = "Length of Y ="
Range("D11").Select
ActiveCell.FormulaR1C1 = "deltaT ="
Range("D12").Select
ActiveCell.FormulaR1C1 = "Maximum Time ="
Range("D13").Select
ActiveCell.FormulaR1C1 = "Frequency of X ="
Range("D14").Select
ActiveCell.FormulaR1C1 = "Frequency of Y ="
Range("D15").Select
ActiveCell.FormulaR1C1 = "Frequency of Time ="
Range("E5").Select
ActiveCell.FormulaR1C1 = aa
Range("E6").Select
ActiveCell.FormulaR1C1 = bb
Range("E7").Select
ActiveCell.FormulaR1C1 = DeltaX
Range("E8").Select
ActiveCell.FormulaR1C1 = DeltaY
Range("E9").Select
ActiveCell.FormulaR1C1 = SizeX
Range("E10").Select
ActiveCell.FormulaR1C1 = SizeY
Range("E11").Select
ActiveCell.FormulaR1C1 = DeltaT
Range("E12").Select
ActiveCell.FormulaR1C1 = Tmax
Range("E13").Select
ActiveCell.FormulaR1C1 = Gx
Range("E14").Select
ActiveCell.FormulaR1C1 = Gy
Range("E15").Select
ActiveCell.FormulaR1C1 = Gt
Range("H5:J5").Select
With Selection
    .HorizontalAlignment = xlCenter
```

```
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
ActiveCell.FormulaR1C1 = "Initial Condition"
Range("H6:I6").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
With Selection
    .HorizontalAlignment = xlRight
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = True
End With
Range("J6").Select
With Selection
    .HorizontalAlignment = xlLeft
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .IndentLevel = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Range("H6:I6").Select
ActiveCell.FormulaR1C1 = "Time = 0    T ="
Range("J6").Select
ActiveCell.FormulaR1C1 = Val(txtTzero.Text)
Range("H8:J8").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
ActiveCell.FormulaR1C1 = "Boundary Condition"
Range("H9:I9").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
```

```
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
With Selection
    .HorizontalAlignment = xlRight
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = True
End With
Range("H10:I10").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
With Selection
    .HorizontalAlignment = xlRight
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = True
End With
Range("H11:I11").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
End With
Selection.Merge
With Selection
    .HorizontalAlignment = xlRight
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = True
End With
Range("H12:I12").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
```

```
    .MergeCells = False
  End With
  Selection.Merge
  With Selection
    .HorizontalAlignment = xlRight
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = True
  End With
  Range("J9:J12").Select
  With Selection
    .HorizontalAlignment = xlLeft
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .IndentLevel = 0
    .ShrinkToFit = False
    .MergeCells = False
  End With
  Range("H9:I12").Select
  ActiveCell.FormulaR1C1 = "x = 0      T ="
  Range("H10:I10").Select
  ActiveCell.FormulaR1C1 = "x = " & SizeX & "     T ="
  Range("H11:I11").Select
  ActiveCell.FormulaR1C1 = "y = 0      T ="
  Range("H12:I12").Select
  ActiveCell.FormulaR1C1 = "y = " & SizeY & "     T ="
  Range("J9").Select
  ActiveCell.FormulaR1C1 = Val(txtX1.Text)
  Range("J10").Select
  ActiveCell.FormulaR1C1 = Val(txtX2.Text)
  Range("J11").Select
  ActiveCell.FormulaR1C1 = Val(txtY1.Text)
  Range("J12").Select
  ActiveCell.FormulaR1C1 = Val(txtY2.Text)

  Range("B17:M17").Select
  With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .ShrinkToFit = False
    .MergeCells = False
  End With
  Selection.Merge
  ActiveCell.FormulaR1C1 = _
    "Numerical Result by using Alternating Direction Implicit Method"
  Range("B20:CC2000").Select
  Selection.NumberFormat = "0.####"
  With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
```

```
        .Orientation = 0
        .ShrinkToFit = False
        .MergeCells = False
    End With
    For k = 0 To (RT / Gt)
        Range("B" & k * ((RY / Gy) + 6) + 18 & ":D" & k * ((RY / Gy) + 6) + 18).Select
    With Selection
        .HorizontalAlignment = xlCenter
        .VerticalAlignment = xlBottom
        .WrapText = False
        .Orientation = 0
        .ShrinkToFit = False
        .MergeCells = True
    End With
    ActiveCell.FormulaR1C1 = "Time = " & k * DeltaT * Gt
    Next k
    For k = 0 To (RT / Gt)
    Range("C" & k * ((RY / Gy) + 6) + 19 & ":" & GetOne((RX / Gx) + 2) & k * ((RY / Gy) + 6) + 19).Select
    With Selection
        .HorizontalAlignment = xlCenter
        .VerticalAlignment = xlBottom
        .WrapText = False
        .Orientation = 0
        .ShrinkToFit = False
        .MergeCells = True
    End With
    ActiveCell.FormulaR1C1 = "x"
    Range("C" & k * ((RY / Gy) + 6) + 19 + (RY / Gy) + 4 & ":" & GetOne((RX / Gx) + 2) & k * ((RY / Gy) + 6) + 19 + (RY
/ Gy) + 4).Select
    With Selection
        .HorizontalAlignment = xlCenter
        .VerticalAlignment = xlBottom
        .WrapText = False
        .Orientation = 0
        .ShrinkToFit = False
        .MergeCells = True
    End With
    ActiveCell.FormulaR1C1 = "x"
    Next k
    For k = 0 To RT / Gt
        For i = 0 To RX / Gx
            xlSheet1.Cells(k * ((RY / Gy) + 6) + 20, i + 3).Value = i * DeltaX * Gx
            xlSheet1.Cells(k * ((RY / Gy) + 6) + 20 + (RY / Gy) + 2, i + 3).Value = i * DeltaX * Gx
        Next i
    Next k
    For k = 0 To RT / Gt
        Range("A" & k * ((RY / Gy) + 6) + 21 & ":A" & k * ((RY / Gy) + 6) + 21 + (RY / Gy)).Select
    With Selection
        .HorizontalAlignment = xlCenter
        .VerticalAlignment = xlBottom
        .WrapText = False
        .Orientation = 0
        .ShrinkToFit = False
        .MergeCells = False
    End With
    Selection.Merge
```

```
    With Selection
        .HorizontalAlignment = xlCenter
        .VerticalAlignment = xlCenter
        .WrapText = False
        .Orientation = 0
        .ShrinkToFit = False
        .MergeCells = True
    End With
    ActiveCell.FormulaR1C1 = "y"
    Range(GetOne((RX / Gx) + 4) & k * ((RY / Gy) + 6) + 21 & ":" & GetOne((RX / Gx) + 4) & k * ((RY / Gy) + 6) + 21 +
(RY / Gy)).Select
    With Selection
        .HorizontalAlignment = xlCenter
        .VerticalAlignment = xlBottom
        .WrapText = False
        .Orientation = 0
        .ShrinkToFit = False
        .MergeCells = False
    End With
    Selection.Merge
    With Selection
        .HorizontalAlignment = xlCenter
        .VerticalAlignment = xlCenter
        .WrapText = False
        .Orientation = 0
        .ShrinkToFit = False
        .MergeCells = True
    End With
    ActiveCell.FormulaR1C1 = "y"
    Next k
    For k = 0 To RT / Gt
        For j = 0 To RY / Gy
            xlSheet1.Cells(k * ((RY / Gy) + 6) + j + 21, 2).Value = j * DeltaY * Gy
            xlSheet1.Cells(k * ((RY / Gy) + 6) + j + 21, 2 + (RX / Gx) + 2).Value = j * DeltaY * Gy
        Next j
    Next k
    For k = 0 To RT / Gt
        For j = 0 To RY / Gy
            For i = 0 To RX / Gx
                TF(i, j, k) = TNew(i * Gx, j * Gy, k * Gt)
                xlSheet1.Cells(k * ((RY / Gy) + 6) + j + 21, i + 3) = TF(i, j, k)
            Next i
        Next j
    Next k
    For k = 0 To RT / Gt
    Range("C" & k * ((RY / Gy) + 6) + 21 & ":" & GetOne((RX / Gx) + 2) & k * ((RY / Gy) + 6) + 19 + (RY / Gy) +
2).Select
    Selection.Borders(xlDiagonalDown).LineStyle = xlNone
    Selection.Borders(xlDiagonalUp).LineStyle = xlNone
    With Selection.Borders(xlEdgeLeft)
        .LineStyle = xlContinuous
        .Weight = xlMedium
        .ColorIndex = xlAutomatic
    End With
    With Selection.Borders(xlEdgeTop)
        .LineStyle = xlContinuous
```

```
        .Weight = xlMedium
        .ColorIndex = xlAutomatic
    End With
    With Selection.Borders(xlEdgeBottom)
        .LineStyle = xlContinuous
        .Weight = xlMedium
        .ColorIndex = xlAutomatic
    End With
    With Selection.Borders(xlEdgeRight)
        .LineStyle = xlContinuous
        .Weight = xlMedium
        .ColorIndex = xlAutomatic
    End With
    Selection.Borders(xlInsideVertical).LineStyle = xlNone
    Selection.Borders(xlInsideHorizontal).LineStyle = xlNone
    Next k
        Range("A1").Select
        End
End Sub
Function GetOne(nn As Integer) As String
Dim L As Integer
Dim xx, xx2 As String
L = Int(nn / 26)
If L < 1 Then
  xx = Chr(65 + nn)
ElseIf L = 1 Then
  xx = "Z"
Else
  xx = Chr(64 + L)
End If
If (nn - 26) > 0 Then
   xx2 = "A" & Chr(65 + (nn - (26 * L)))
Else
   xx2 = xx
End If
If (nn - 52) > 0 Then
   xx2 = "B" & Chr(65 + (nn - (26 * L)))
Else
   xx2 = xx
End If
If (nn - 78) > 0 Then
   xx2 = "C" & Chr(65 + (nn - (26 * L)))
Else
   xx2 = xx
End If
If (nn - 104) > 0 Then
   xx2 = "D" & Chr(65 + (nn - (26 * L)))
Else
   xx2 = xx
End If

If (nn - 130) > 0 Then
   xx2 = "E" & Chr(65 + (nn - (26 * L)))
Else
   xx2 = xx
End If
```

```
GetOne = xx2
End Function
Function GetLastRCD1(rr As Integer) As String
GetLastRCD1 = "R" & Trim(Str(rr + 2)) & "C2"
End Function
Function GetLastXY(nn As Integer, yy As Integer) As String
L = Int(nn / 26)
If L < 1 Then
  xx = Chr(65 + nn)
ElseIf L = 1 Then
  xx = "Z"
Else
  xx = Chr(64 + L)
End If
If (nn - 26) > 0 Then
   xx2 = xx & Chr(65 + (nn - (26 * L)))
Else
   xx2 = xx
End If
GetLastXY = xx2 & Trim(Str(yy + 2))
End Function
Function GetLastRCD2(rr1 As Integer, rr2 As Integer) As String
GetLastRCD2 = "R" & Trim(Str(rr1 + 1)) & "C" & Trim(Str(rr2 + 1))
End Function
```

CURRICULUM VITAE

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