

Excel VBA 在城市工程测量中的应用

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Application of Excel VBA in Urban and Engineering Surveying

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摘要: 介绍了在城市工程测量中利用 Excel VBA 结合 AutoCAD 进行二次开发, 减少中间过程, 提高工作效率。

关键词: 工程测量, Excel VBA, AutoCAD, 坐标

1 前言

Excel 是大家在工作中经常使用的办公软件之一, 在使用过程中, 你是否有感觉不方便的时候? 例如, 计算一个角度的三角函数值, 测量工作中的角度单位是 60 进制, 而 Excel 本身无法直接计算 60 进制的角度的三角函数, 它使用的是弧度值。还有, 如果你的工作表中有了点坐标值(二维或者三维), 要在 AutoCAD 中展绘出来, 怎样才能又快又准确? 其实, 微软为 Excel 提供了二次开发的功能, 只要对 Excel 进行一些二次开发, 就可以达到事半功倍的效果。

初识 Visual Basic 编辑器, 必须懂得一些简单的 VB 编程常识。打开 Excel, 按 Alt + F11 即可进入 Visual Basic 编辑器。下面举例说明如何定义一个函数, 然后利用它来解决 60 进制的角度的三角函数计算问题。在菜单上依次点击[插入]—[模块], 然后就可以输入代码了。

2 Excel 中编写导线计算程序

城市工程测量中, 有时经常碰到导线计算的问题, 如果手头没有平差计算程序就只有手工计算了, 下面是笔者在工作当中编写的一个附合导线计算程序, 代码很简单, 但很实用。该程序的代码如下:

```
Public Const pi = 3.14159265358979
Public Function dfm( ByVal date1 As Double ) As Double
    Dim d1 As Double ,d2 As Double ,d3 As Double ,d4 As Double ,
    d As Double
    d1 = Fix( date1 )
    d2 = date1 - d1
    d2 = d2 * 60
```

```
d3 = Fix( d2 )
d4 = d2 - d3
d4 = d4 * 60
d4 = Round( d4 )
If ( d4 - 60 ) > = 0 Then
    d4 = d4 - 60
    d3 = d3 + 1
End If
If ( d3 - 60 ) > = 0 Then
    d3 = d3 - 60
    d1 = d1 + 1
End If
d3 = d3/100
d4 = d4/10000
d = d1 + d3 + d4
dfm = Round( d / 4 )
End Function
Public Function du( ByVal Data1 As Double )
Dim d1 As Double ,d2 As Double ,d As Double ,d5 As Double ,d6
As Double
d1 = Fix( Data1 )
d2 = Round( Data1 - d1 / 7 )
d2 = d2 * 100
d5 = Fix( Val( Trim( Str( d2 ) ) ) )
d5 = d5/60
d6 =( d2 - Fix( Val( Trim( Str( d2 ) ) ) ) )/36
d = d1 + d5 + d6
du = d
End Function
Sub fhd( )
Dim m As Integer ,n As Integer ,ms As Double ,gz As Double ,sht
As Object ,xx As Double ,yy As Double ,S As Double
Set sht = ThisWorkbook. ActiveSheet
ms = du( sht. Cells( 3 , 4 ) )
Do While sht. Cells( m + 3 , 3 ) < > " "
    m = m + 1
Loop
```

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```

For n = 3 To m + 2
    ms = ms + du( sht. Cells( n , 3 )) - 180
    S = S + sht. Cells( n , 2 )
Next
Do While ms < 0
    ms = ms + 360
Loop
Do While ms > 360
    ms = ms - 360
Loop
gz = ms - du( sht. Cell( 3 + m 4 ))
xx = 0 : yy = 0
For n = 4 To m + 2
    方位角
    sht. Cells( n 4 ) = Format( dfr( du( sht. Cells( n - 1 4 )) + du
( sht. Cells( n - 1 3 )) - 180 - ( gz/m ) , "0.0000" )
    坐标增量
    sht. Cells( n 5 ) = Format( sht. Cells( n - 1 2 ) * Cos( du( sht.
Cells( n 4 )) * pi/180 ) , "0.000" )
    sht. Cells( n 6 ) = Format( sht. Cells( n - 1 2 ) * Sin( du( sht.
Cells( n 4 )) * pi/180 ) , "0.000" )
    坐标增量和
    xx = xx + sht. Cells( n 5 )
    yy = yy + sht. Cells( n 6 )
Next
xx = xx + sht. Cells( 3 9 ) - sht. Cells( m + 2 9 )
yy = yy + sht. Cells( 3 10 ) - sht. Cells( m + 2 10 )
sht. Cells( m + 4 5 ) = " Δα = " & Format( gz * 3600 , "0" ) & " s"
sht. Cells( m + 4 6 ) = " ΔX = " & Format( xx , "0.000" ) & " m"

```

```

sht. Cells( m + 4 7 ) = " ΔY = " & Format( yy , "0.000" ) & " m"
sht. Cells( m + 4 3 ) = " ΣS = " & Format( S , "0.000" ) & " m"
sht. Cells( m + 4 9 ) = " ΔS = " & Format( Sqr( xx * xx + yy *
yy ) , "0.000" ) & " m"
sht. Cells( m + 4 10 ) = " 相对精度 1/" & Format( S/Sqr( xx * xx +
yy * yy ) , "#####" )
For n = 4 To m + 2
    sht. Cells( n 7 ) = Format( xx/S * sht. Cells( n - 1 3 ) , "0.
000" )
    sht. Cells( n 8 ) = Format( yy/S * sht. Cells( n - 1 3 ) , "0.
000" )
Next
For n = 4 To m + 1
    sht. Cells( n 9 ) = sht. Cells( n - 1 9 ) + sht. Cells( n 5 ) -
sht. Cells( n 7 )
    sht. Cells( n 10 ) = sht. Cells( n - 1 10 ) + sht. Cells( n 6 ) -
sht. Cells( n 8 )
Next
Columns( " F K" ). Select
Selection.NumberFormatLocal = "0.000_"
End Sub

```

如果定义一个名为“ 计算 ”的按钮 指定此工具的宏为“ 拟合导线计算 ”,那么 ,只要按下面的格式输入原始数据(斜体是要求输入的见下表) 点“ 计算 ”就可以得到计算结果了。所有的过程都是自动的 ,无须再手工填写。

点名	距离	观测角	方位角	Δx	Δy	δx	δy	X	Y
P428									
P427	<i>141.953</i>	<i>181.2217</i>	<i>332.1133</i>					<i>51513.508</i>	<i>65169.365</i>
D1	<i>52.378</i>	<i>273.3336</i>	333.3351	127.109	-63.197	-0.001	0.004	51640.618	65106.164
D2	<i>76.275</i>	<i>173.395</i>	67.0728	20.361	48.259	-0.002	0.007	51660.981	65154.416
D3	<i>161.026</i>	<i>179.3631</i>	60.4719	37.225	66.575	-0.001	0.004	51698.207	65220.987
D4	<i>258.818</i>	<i>179.2426</i>	60.2351	79.544	140.008	-0.001	0.004	51777.752	65360.991
D5	<i>127.398</i>	<i>195.2918</i>	59.4818	130.171	223.701	-0.001	0.004	51907.924	65584.688
D6	<i>205.151</i>	<i>165.5027</i>	75.1737	32.342	123.224	-0.001	0.005	51940.267	65707.907
D7	<i>153.592</i>	<i>179.5713</i>	61.0805	99.037	179.662	-0.001	0.004	52039.305	65887.565
D8	<i>229.048</i>	<i>176.5003</i>	61.0519	74.255	134.450	-0.001	0.004	52113.561	66022.011
P581		<i>183.4814</i>	57.5523	121.638	194.081	-0.001	0.004	<i>52235.199</i>	<i>66216.094</i>
P582			<i>61.4335</i>						
		ΣS = 1405.639m		Δα = -7s	ΔX = -0.009m	ΔY = 0.034m		ΔS = 0.035m	相对精度 1/39966

3 Excel 与 AutoCAD 的连接和通讯

进入 Visual Basic 编辑器 [工具] → [引用] 在 “ AutoCAD 2000 object Library ” 的左边打钩 , 点确定就可以了。在模块中输入以下代码 :

```
Global Sheet As Object , acadmtext As acadmtext , fontHight As
```

```

Double
Global xlBook As Excel. Workbook
Global p0( 2 ) As Double , p1( 2 ) As Double , p2( 2 ) As Double
Global acadApp As Object
Global acadDoc As Object
Global number As Integer , p( 2 ) As Double
Public Function GetAcad( dwt As String ) As Boolean

```

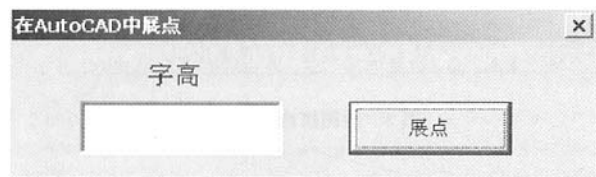
```

Dim Face As String
Dim Bold As Boolean
Dim Italic As Boolean
Dim CharSet As Long
Dim PitchandFamily As Long
On Error Resume Next
Set acadApp = GetObject( , "AutoCAD.Application" )
If Err Then
    Err. Clear
    Set acadApp = CreateObject( "AutoCAD.Application" )
If Err Then
    MsgBox "请安装 AutoCAD 2000 以上版本" _
        , vbCritical , "autocad"
    Exit Function
On Error GoTo 0
GetAcad = False
Exit Function
End If
End If
Set acadDoc = acadApp. ActiveDocument
acadApp. Visible = True
GetAcad = True
acadDoc. ActiveTextStyle. GetFont Face , Bold , Italic , CharSet ,
PitchandFamily
acadDoc. ActiveTextStyle. SetFont "宋体" , Bold , Italic , CharSet ,
PitchandFamily
0 :
End Function
Public Function Draw_Point( Point( ) As Double ) As acadPoint
    Set Draw_Point = acadDoc. ModelSpace. AddPoint( Point )
    Draw_Point. Update
End Function
Public Sub Set_layer( s As String )
Dim layerObj As AcadLayer
    'Add the layer to the layers collection
Set layerObj = acadDoc. Layers. Add( s )
    'Make the new layer the active layer for the drawing
acadDoc. ActiveLayer = layerObj
End Sub

```

再按以下模式做个对话框:窗体的名字为

“Form1”



双击“展点”按钮 输入以下代码:

```

Dim p1( 2 ) As Double
Dim txt As AcadText
Dim i As Integer
TextBox1. SetFocus
Call GetAcad( "" )
Set Sheet = ThisWorkbook. ActiveSheet

```

```

Do While Sheet. Cells( i + 1 , 1 ) < > "" Or Sheet. Cells( i + 1 , 4 )
< > ""
    If Sheet. Cells( i + 1 , 2 ) = "" Or Sheet. Cells( i + 1 , 3 ) = ""
Then GoTo II
    With Sheet
        p1( 1 ) = . Cells( i + 1 , 2 ). Value
        p1( 0 ) = . Cells( i + 1 , 3 ). Value
    End With
    fontHight = TextBox1. Text
    If Cells( i + 1 , 4 ) = "" Then
        Call Set_layer( "zbc" )
        Call Draw_Point( p1 )
        Set txt = acadDoc. ModelSpace. AddText( Cells( i + 1 , 1 ) ,
p1 , fontHight )
    Else
        Call Set_layer( "GCD" )
        Call Draw_Point( p1 )
        Set txt = acadDoc. ModelSpace. AddText( Cells( i + 1 , 4 ) ,
p1 , fontHight )
    End If
    txt. Color = 1
II :
    i = i + 1
Loop
acadApp. ZoomExtents

```

在 Excel 上同样可以再加个工具按钮,比如名为“展点”,指定宏为“显示对话框”,只要 Excel 有了 X, Y 或者 X, Y, Z 点击“展点”就可以自动启动 AutoCAD 展点。如果 AutoCAD 已经启动,就直接在已经打开的 AutoCAD 文档中展点,展点完毕后,再切换到 AutoCAD 所要展的点已经出现在 AutoCAD 中。如果有点号,还可以显示点号,并且可以输入字体的高度。

下面是坐标格式,其中第 1 列为点名,第 2 列为 X,第 3 列为 Y,第 4 列为高程。其中 X, Y 是测量坐标系的横坐标和纵坐标,程序会自动转换为 AutoCAD 中的坐标系。

J1 45655.455 65466.456 123.123

4 结 语

Excel 的二次开发功能是非常强大的,如果有兴趣,利用 Excel 的 Visual Basic 编辑器还可以开发出很多实用的测绘程序,可以大大提高工作效率。

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