II.2.4.Realizarea unui program ce determina diagramele de evolutie a unor parametri cinematici ai mecanismului patrulater.

Nota:
-programul este editat in Visual Basic cu executie in Autocad 2004;
-parametri cinematici ce se urmaresc a fi determinati sunt:pozitia,viteza,acceleratia punctului B reprezentati in fig.2.16.

- In fig.2.16 se arata o pozitie oarecare a mecanismului
  α - este pozitia manivelei fata de planul vertical,si este considerat pozitiv in sens trigonometric;
  s - este lugimea arcului de cerc din punctul extrem E1 pana in punctul B;
  v - este viteza tangenta si rezultanta a punctului B la cercul descris de acesta;
  a - este acceleratia tangenta a punctului B la cercul descris de acesta;

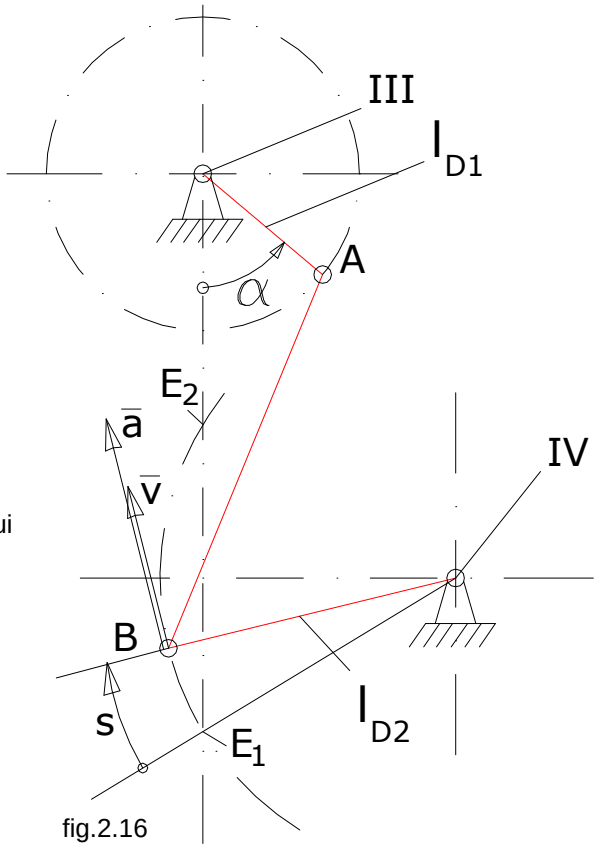
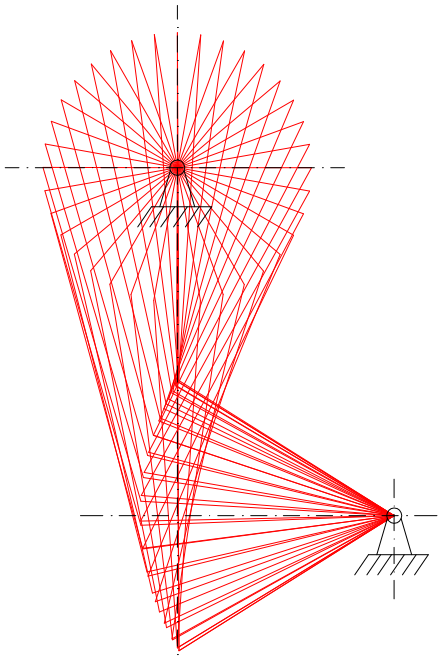


fig.2.16

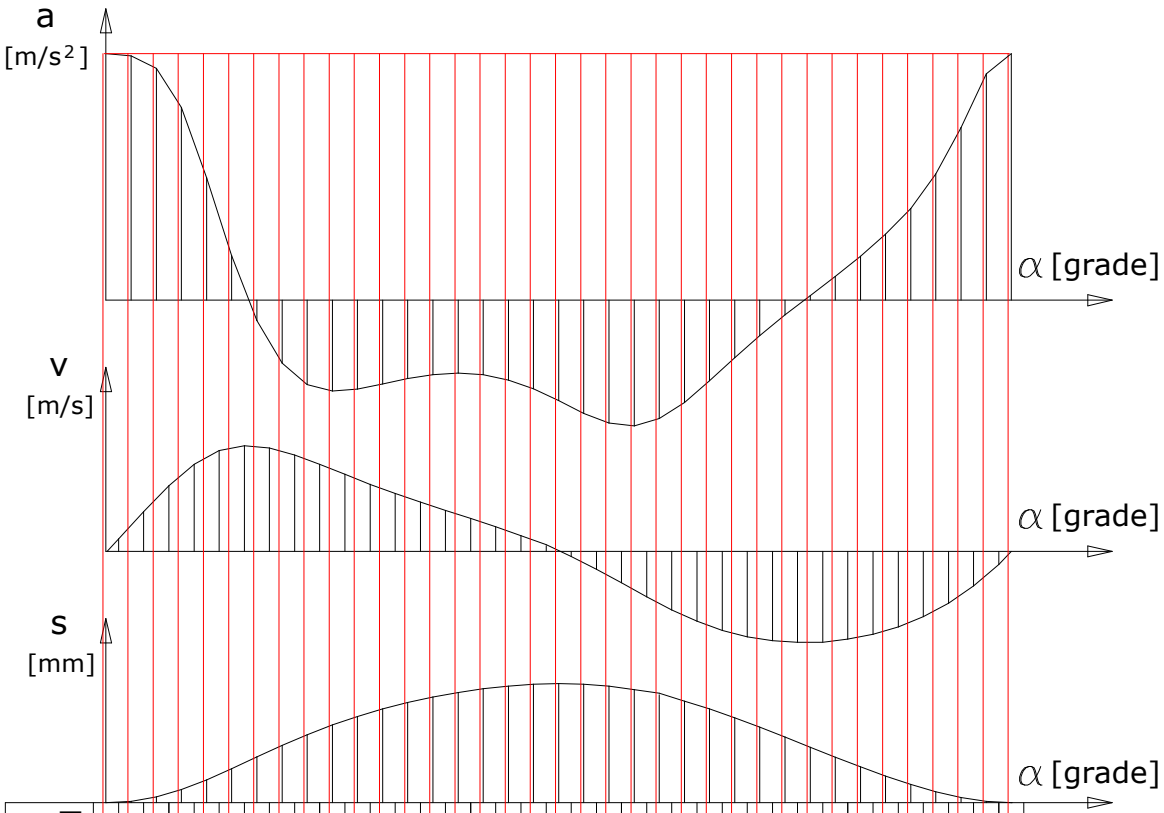
- Posibilitatiile programului
  -se poate realiza pozitia mecanismului pentru o anumita valoare a lui α ;
  -se pot realiza pozitiile succesive ale mecanismului functie de numarul dorit de pozitii sau functie de unghiul intre doua pozitii succesive.
  -se pot determina diagramele de evolutie a parametrilor cinematici,descrisi mai sus,functie de pozitiile succesive ale mecanismului
  -pozitiile succesive si diagramele se pot determina pentru orice caracteristici dimensionale ale macanismului patrulater (l_{D1},l_{D2}.l,v_{56} si h_{56} ,vezi fig.2.6),cu conditia ca dreapta ce este definita de punctele extreme E1 si E2 sa treaca prin centrul de rotatie al manivelei (axa III).

Executia programului pentru cazul in care am ales intervalul intre doua pozitii succesive a manivelei 10 grade

- In fig.2.17 se arata pozitiile succesive ale mecanismului. Aceste pozitii succesive servesc la determinarea parametrilor cinematici(s,v si a) descrisi mai sus,fig.2.16.In figura alaturata pozitiile succesive ale mecanismului sunt realizate pentru α primind valori din 10 in 10 grade.


fig.2.17

www.mariussuciu.ro



α [grade]	s [mm]	v [m/s]	a [m/s²]
0	0	0	19.62
10	1.11	0 .1	19.44
20	4.62	0 .32	18.76
30	10.44	0 .52	15.35
40	18.16	0 .69	9.76
50	27.09	0 .8	3.56
60	36.45	0 .84	-1.62
70	45.62	0 .82	-5.01
80	54.16	0 .77	-6.7
90	61.88	0 .69	-7.21
100	68.71	0 .61	-7.07
110	74.66	0 .54	-6.67
120	79.8	0 .46	-6.24
130	84.16	0 .39	-5.92
140	87.79	0 .33	-5.8
150	90.7	0 .26	-5.93
160	92.89	0 .2	-6.35
170	94.29	0 .13	-7.05
180	94.82	0 .05	-7.99
190	94.36	-0.04	-9
200	92.79	-0.14	-9.78
210	90.01	-0.25	-9.99
220	86	-0.36	-9.42
230	80.83	-0.47	-8.13
240	74.65	-0.56	-6.42
250	67.68	-0.63	-4.59
260	60.14	-0.68	-2.82
270	52.26	-0.71	-1.17
280	44.23	-0.72	.37
290	36.25	-0.72	1.9
300	28.5	-0.7	3.5
310	21.18	-0.66	5.27
320	14.51	-0.6	7.31
330	8.75	-0.52	10.5
340	4.18	-0.41	13.7
350	1.14	-0.27	18.09
360	0	-0.1	19.62
		0	

fig.2.18

- In fig.2.18 se arata diagramele de evolutie a parametrilor cinematici α,*s,v* si *a* ,descrisi mai sus.
  -segmentele rosii din dreapta fiecarei valori din tabel indica pozitia acesteia pe diagrame.
  -valorile din tabel diferie de 0 sunt toate valori aproximative.
  -lungimea arcului de cerc s[mm] este aproximat printr-o suma de segmente
  -viteza v[m/s] si acceleratia a[m/s2]-este o valoare medie pe acel interval de 10 grade,iar segmentele din partea de sus si de jos arata intervalul in care se gaseste valoarea medie.

Programul ce realizeaza pozitiile succesive si diagramele parametrilor cinematici s,v si a functie de α

www.mariussuciu.ro

Programul ce realizeaza pozitiile succesive si diagramele parametrilor cinematici s,v si a functie de α
```
Dim alfa As Double
Dim intPoints As Variant
Sub DESENEAZA()
'acesta functie inregistreaza datele de desenare a mecanismului

    'linie MANIVELA
    Dim lineObj As AcadLine
    Dim startPoint(0 To 2) As Double
    Dim endPoint(0 To 2) As Double
    raza = 45
    startPoint(0) = 0#: startPoint(1) = 0#: startPoint(2) = 0#
    endPoint(0) = raza * Sin(alfa * 3.14 / 180): endPoint(1) = -raza * Cos(alfa * 3.14 / 180): endPoint(2) = 0
    Set lineObj = ThisDrawing.ModelSpace.AddLine(startPoint, endPoint)

    'cerc  BALANSIER
    Dim circleObj As AcadCircle
    Dim centerPoint(0 To 2) As Double
    Dim radius As Double
    centerPoint(0) = 72.7: centerPoint(1) = -116#:
    'centerPoint(2) = 0#
    radius = 85#
    Set circleObj = ThisDrawing.ModelSpace.AddCircle(centerPoint, radius)
    ZoomAll

    'cerc2 BIELA
    Dim circleObj2 As AcadCircle
    Dim centerPoint2(0 To 2) As Double
    Dim radius2 As Double
    centerPoint2(0) = endPoint(0): centerPoint2(1) = endPoint(1):
    'centerPoint2(2) = 0
    radius2 = 116#
    Set circleObj2 = ThisDrawing.ModelSpace.AddCircle(centerPoint2, radius2)
    ZoomAll

     'intersectia
    intPoints = circleObj.IntersectWith(circleObj2, acExtendNone)

   'BIELA
    Dim lineObj2 As AcadLine
    Dim startPoint2(0 To 2) As Double
    Dim endPoint2(0 To 2) As Double
    startPoint2(0) = endPoint(0): startPoint2(1) = endPoint(1):
    'startPoint2(2) = 0
    endPoint2(0) = intPoints(0): endPoint2(1) = intPoints(1): endPoint2(2) = 0
    Set lineObj2 = ThisDrawing.ModelSpace.AddLine(startPoint2, endPoint2)
    ZoomAll

    'PARGHIE
    Dim lineObj3 As AcadLine
    Dim startPoint3(0 To 2) As Double
    Dim endPoint3(0 To 2) As Double
    startPoint3(0) = centerPoint(0): startPoint3(1) = centerPoint(1): startPoint3(2) = centerPoint(2):
    endPoint3(0) = intPoints(0): endPoint3(1) = intPoints(1): endPoint3(2) = intPoints(2)
    Set lineObj3 = ThisDrawing.ModelSpace.AddLine(startPoint3, endPoint3)
    ZoomAll
    circleObj2.Delete
    circleObj.Delete
   ZoomAll
End Sub
```

www.mariussuciu.ro

```
Sub INITIALIZEAZA()
'aceasta functie deseneaza mecanismul pentru o anumita pozitie alfa
alfa = 10
DESENEAZA
End Sub

Sub MODIFICA()
'aceasta functie deseneaza pozitiile succesive ale mecanismului
Dim I As Integer
alfa = 0
 For I = 1 To 36
 alfa = alfa + 10
 DESENEAZA
 Next I
End Sub

Sub coordarc()
'aceasta functie deseneaza diagramele spat,vit,acc
Dim PCTarc(0 To 360, 0 To 2) As Double
Dim s(0 To 360) As Double
Dim v(0 To 360) As Double
Dim a(0 To 360) As Double
Dim turatia, SCARA_a, SCARA_v, SCARA_s, I As Integer
Dim dist, timp As Double
Dim t As Double
'initializari
dist = 20
n = 36
turatie = 150
t = 60 / n * 1 / turatie

For I = 0 To n
'INREGISTREAZA COORDONATELE

        If I = 0 Then
        alfa = 0:
        Else:
        alfa = alfa + 360 / n
        End If
DESENEAZA
'INREGISTREAZA LUNGIMILE SEGMENTELOR 'S'
PCTarc(I, 0) = intPoints(0): PCTarc(I, 1) = intPoints(1)
SCARA_s = 1
        If I = 0 Or I = n Then
        s(I) = 0:
        Else
         If alfa <= 180 Then
         s(I) = SCARA_s * (s(I - 1) + ((PCTarc(I, 0) - PCTarc(I - 1, 0)) ^ 2 + (PCTarc(I, 1) - PCTarc(I - 1, 1))
^ 2) ^ (1 / 2)):
          Else:
         s(I) = SCARA_s * (s(I - 1) - ((PCTarc(I, 0) - PCTarc(I - 1, 0)) ^ 2 + (PCTarc(I, 1) - PCTarc(I - 1, 1)) ^
2) ^ (1 / 2)):
          End If
        End If
```

www.mariussuciu.ro

```
'INREGISTREAZA VITEZELE V
        If alfa >= 10 Then
        SCARA_v = 100
        v(I) = 1 / 1000 * (s(I) - s(I - 1)) / t:
        End If

'INREGISTREAZA acceleratiile a
        If alfa >= 20 Then
        SCARA_a = 10
        a(I) = (v(I) - v(I - 1)) / t:
        End If

'DETERMINA GRAFICUL POZITIILOR
Dim x_s(0 To 360) As Integer
x_s(I) = I * dist + 100
Dim lineObj_s As AcadLine
Dim startPoint_s(0 To 2) As Double
Dim endPoint_s(0 To 2) As Double
startPoint_s(0) = x_s(I): startPoint_s(1) = 0:
endPoint_s(0) = x_s(I): endPoint_s(1) = startPoint_s(1) + s(I):
Set lineObj_s = ThisDrawing.ModelSpace.AddLine(startPoint_s, endPoint_s)


'DETERMINA GRAFICUL VITEZELOR
Dim x_v(0 To 360) As Integer
'If I = 0 Then
'x_v(I) = I * dist + 100
'Else
If alfa >= 10 Then
x_v(I) = I * dist + 100 - dist / 2
End If
Dim lineObj_v As AcadLine
Dim startPoint_v(0 To 2) As Double
Dim endPoint_v(0 To 2) As Double
startPoint_v(0) = x_v(I): startPoint_v(1) = 200:
endPoint_v(0) = x_v(I): endPoint_v(1) = startPoint_v(1) + v(I) * SCARA_v:
Set lineObj_v = ThisDrawing.ModelSpace.AddLine(startPoint_v, endPoint_v)


'DETERMINA GRAFICUL acceleratiilor
Dim x_a(0 To 360) As Integer
Dim lineObj_a As AcadLine
Dim startPoint_a(0 To 2) As Double
Dim endPoint_a(0 To 2) As Double
If alfa >= 20 Then
x_a(I) = I * dist + 100 - dist
End If
startPoint_a(0) = x_a(I): startPoint_a(1) = 400:
endPoint_a(0) = x_a(I): endPoint_a(1) = startPoint_a(1) + a(I) * SCARA_a:
If I <> 1 Then
Set lineObj_a = ThisDrawing.ModelSpace.AddLine(startPoint_a, endPoint_a)
End If
```

www.mariussuciu.ro

```
'PUNE TEXTUL

 Dim height As Double
 Dim textObj As AcadText
 Dim textString_alfa As String
 Dim textString_s As String
 Dim textString_v As String
 Dim textString_a As String
 Dim startPoint_talfa(0 To 2) As Double
 Dim startPoint_ts(0 To 2) As Double
 Dim startPoint_tv(0 To 2) As Double
 Dim startPoint_ta(0 To 2) As Double
 Dim j As Integer

 height = 7
 startPoint_talfa(0) = startPoint_s(0): startPoint_talfa(1) = startPoint_s(1) - 50:
 startPoint_ts(0) = startPoint_s(0): startPoint_ts(1) = startPoint_s(1) - 120:
 startPoint_tv(0) = startPoint_v(0): startPoint_tv(1) = startPoint_s(1) - 190:
 startPoint_ta(0) = startPoint_a(0): startPoint_ta(1) = startPoint_s(1) - 260:
 textString_alfa = Str(Round(alfa, 1))
 textString_s = Str(Round(s(I), 2))
 textString_v = Str(Round(v(I), 2))
 textString_a = Str(Round(a(I), 2))
Set textObj = ThisDrawing.ModelSpace.AddText(textString_alfa, startPoint_talfa, height): textObj.Rotation
= 3.14 / 2
Set textObj = ThisDrawing.ModelSpace.AddText(textString_s, startPoint_ts, height): textObj.Rotation =
3.14 / 2
If alfa >= 10 Then
Set textObj = ThisDrawing.ModelSpace.AddText(textString_v, startPoint_tv, height): textObj.Rotation =
3.14 / 2
End If
If alfa >= 20 Then
Set textObj = ThisDrawing.ModelSpace.AddText(textString_a, startPoint_ta, height): textObj.Rotation =
3.14 / 2
End If


Next I
ZoomAll
End Sub
```

www.mariussuciu.ro