

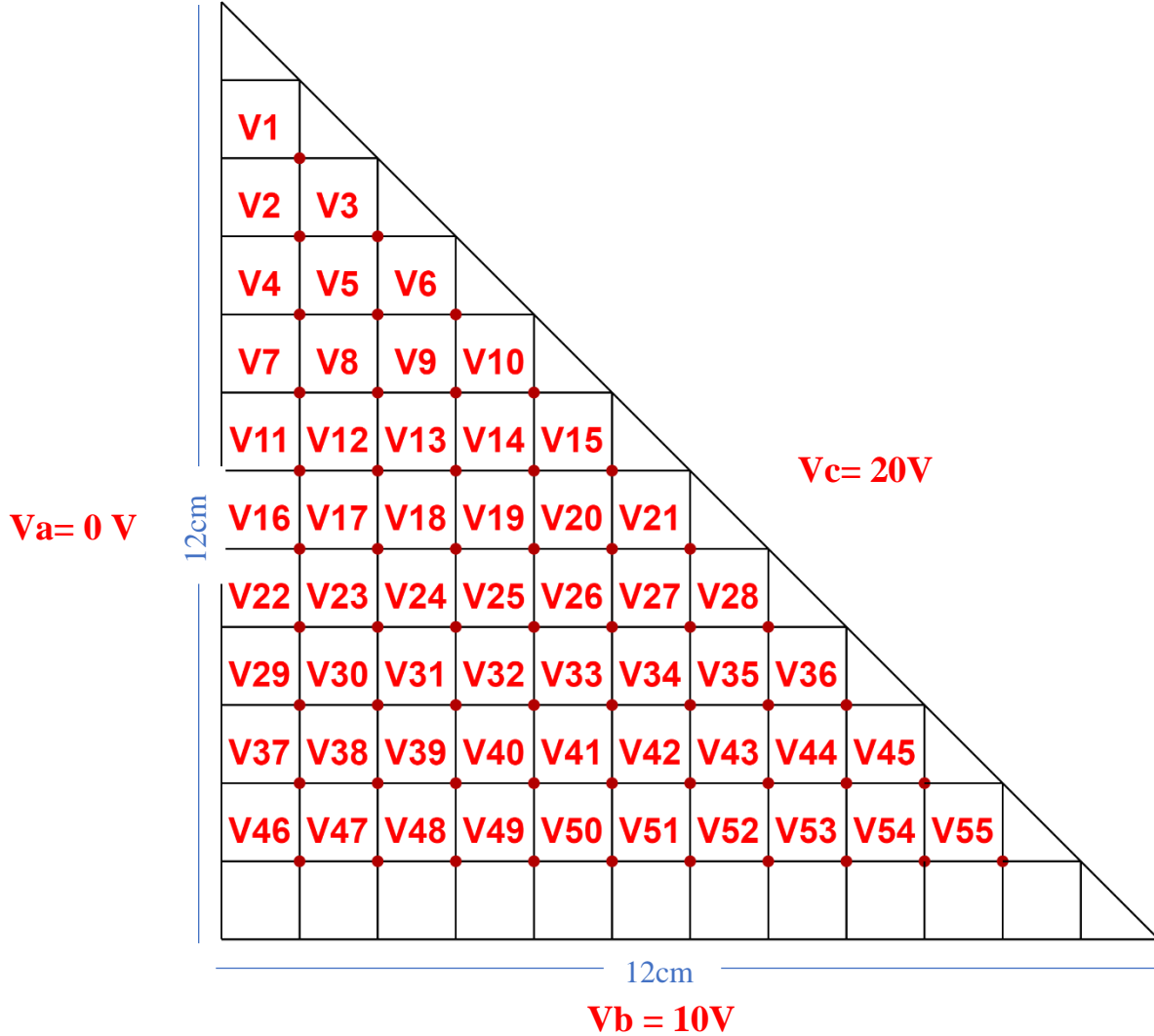
GAZI UNIVERSITY ELECTRICAL ELECTRONICS
ENGINEERING EEE456 ELECTROMAGNETIC MODELLING
PROJECT 1



FEYZANUR BOZTEPE

171110015

ELECTROMAGNETIC MODELLING



```
#include <stdio.h>
```

```
int main()
```

```
    printf("ELECTROMAGNETIC MODELLING PROJECT - 1 \n");
```

```
    int i,j,k,kontrol = 0;
```

```
    //kenar voltajlari ve düğüm voltajlar ilk deger atamasi
```

```
    float VOLT[56] = {0}; //degisken degerler
```

```
    float VOLT_ESKI[56] = {0}; //eski degiskenleri tutacak dizi
```

```
    float Va = 0, Vb = 10, Vc = 20; //kenar voltları
```

```
    float hata[56] = {0}; //hata dizisi
```

//VOLTLARIN HESAPLANMASI

while (i < 100){ //i 100 olana kadar yada Break komutu alana kadar döngü devam
edecek.

for (j = 1; j < 56; j++){ //j=1 den 56 ya kadar devam eder ve j = 56 degerinde
donguden cikacak

VOLT_ESKI[j] = VOLT[j]; //volt degerleri eski_volt degiskeneine
atanir

}

// Her noktadaki voltajın hesaplanması

VOLT[1] = (Va + Vc + Vc + VOLT[2]) / 4;

//*****

VOLT[2] = (Va + VOLT[1] + VOLT[3] + VOLT[4]) / 4;

VOLT[3] = (VOLT[2] + Vc + Vc + VOLT[5]) / 4;

//*****

VOLT[4] = (VOLT[2] + VOLT[5] + Va + VOLT[7]) / 4;

VOLT[5] = (VOLT[3] + VOLT[4] + VOLT[6] + VOLT[8]) / 4;

VOLT[6] = (VOLT[5] + VOLT[9] + Vc + Vc) / 4;

//*****

VOLT[7] = (VOLT[4] + VOLT[9] + VOLT[11] + Va) / 4;

VOLT[8] = (VOLT[5] + VOLT[7] + VOLT[9] + VOLT[12]) / 4;

VOLT[9] = (VOLT[6] + VOLT[8] + VOLT[10] + VOLT[13]) / 4;

VOLT[10] = (VOLT[9] + VOLT[14] + Vc + Vc) / 4;

//*****

VOLT[11] = (VOLT[7] + VOLT[12] + VOLT[16] + Va) / 4;

VOLT[12] = (VOLT[8] + VOLT[11] + VOLT[13] + VOLT[17]) / 4;

VOLT[13] = (VOLT[9] + VOLT[12] + VOLT[14] + VOLT[18]) / 4;

$$\text{VOLT}[14] = (\text{VOLT}[10] + \text{VOLT}[13] + \text{VOLT}[15] + \text{VOLT}[19]) / 4;$$

$$\text{VOLT}[15] = (\text{VOLT}[20] + \text{VOLT}[14] + \text{Vc} + \text{Vc}) / 4;$$

/**/

$$\text{VOLT}[16] = (\text{VOLT}[11] + \text{VOLT}[17] + \text{VOLT}[22] + \text{Va}) / 4;$$

$$\text{VOLT}[17] = (\text{VOLT}[12] + \text{VOLT}[16] + \text{VOLT}[18] + \text{VOLT}[23]) / 4;$$

$$\text{VOLT}[18] = (\text{VOLT}[13] + \text{VOLT}[17] + \text{VOLT}[19] + \text{VOLT}[24]) / 4;$$

$$\text{VOLT}[19] = (\text{VOLT}[14] + \text{VOLT}[18] + \text{VOLT}[20] + \text{VOLT}[25]) / 4;$$

$$\text{VOLT}[20] = (\text{VOLT}[15] + \text{VOLT}[19] + \text{VOLT}[21] + \text{VOLT}[26]) / 4;$$

$$\text{VOLT}[21] = (\text{VOLT}[20] + \text{VOLT}[27] + \text{Vc} + \text{Vc}) / 4;$$

/**/

$$\text{VOLT}[22] = (\text{VOLT}[26] + \text{VOLT}[23] + \text{VOLT}[29] + \text{Va}) / 4;$$

$$\text{VOLT}[23] = (\text{VOLT}[17] + \text{VOLT}[22] + \text{VOLT}[24] + \text{VOLT}[30]) / 4;$$

$$\text{VOLT}[24] = (\text{VOLT}[18] + \text{VOLT}[23] + \text{VOLT}[25] + \text{VOLT}[31]) / 4;$$

$$\text{VOLT}[25] = (\text{VOLT}[19] + \text{VOLT}[24] + \text{VOLT}[26] + \text{VOLT}[32]) / 4;$$

$$\text{VOLT}[26] = (\text{VOLT}[20] + \text{VOLT}[27] + \text{VOLT}[25] + \text{VOLT}[33]) / 4;$$

$$\text{VOLT}[27] = (\text{VOLT}[21] + \text{VOLT}[26] + \text{VOLT}[28] + \text{VOLT}[34]) / 4;$$

$$\text{VOLT}[28] = (\text{VOLT}[27] + \text{VOLT}[35] + \text{Vc} + \text{Vc}) / 4;$$

/**/

$$\text{VOLT}[29] = (\text{VOLT}[22] + \text{VOLT}[30] + \text{VOLT}[37] + \text{Va}) / 4;$$

$$\text{VOLT}[30] = (\text{VOLT}[23] + \text{VOLT}[29] + \text{VOLT}[31] + \text{VOLT}[38]) / 4;$$

$$\text{VOLT}[31] = (\text{VOLT}[24] + \text{VOLT}[30] + \text{VOLT}[32] + \text{VOLT}[39]) / 4;$$

$$\text{VOLT}[32] = (\text{VOLT}[25] + \text{VOLT}[33] + \text{VOLT}[31] + \text{VOLT}[40]) / 4;$$

$$\text{VOLT}[33] = (\text{VOLT}[26] + \text{VOLT}[32] + \text{VOLT}[34] + \text{VOLT}[41]) / 4;$$

$$\text{VOLT}[34] = (\text{VOLT}[27] + \text{VOLT}[35] + \text{VOLT}[42] + \text{VOLT}[33]) / 4;$$

$$\text{VOLT}[35] = (\text{VOLT}[28] + \text{VOLT}[34] + \text{VOLT}[36] + \text{VOLT}[43]) / 4;$$

$$\text{VOLT}[36] = (\text{VOLT}[35] + \text{VOLT}[44] + \text{Vc} + \text{Vc}) / 4;$$

/**/

$$\text{VOLT}[37] = (\text{VOLT}[29] + \text{VOLT}[38] + \text{VOLT}[46] + \text{Va}) / 4;$$

```

VOLT[38] = (VOLT[30] + VOLT[39] + VOLT[37] + VOLT[47]) / 4;
VOLT[39] = (VOLT[31] + VOLT[40] + VOLT[48] + VOLT[38]) / 4;
VOLT[40] = (VOLT[32] + VOLT[41] + VOLT[49] + VOLT[39]) / 4;
VOLT[41] = (VOLT[33] + VOLT[42] + VOLT[50] + VOLT[40]) / 4;
VOLT[42] = (VOLT[34] + VOLT[43] + VOLT[51] + VOLT[41]) / 4;
VOLT[43] = (VOLT[35] + VOLT[44] + VOLT[52] + VOLT[42]) / 4;
VOLT[44] = (VOLT[36] + VOLT[45] + VOLT[53] + VOLT[43]) / 4;
VOLT[45] = (VOLT[54] + VOLT[44] + Vc + Vc) / 4;

```

```

//*****/

```

```

VOLT[46] = (VOLT[37] + VOLT[47] + Va + Vb) / 4;
VOLT[47] = (VOLT[38] + VOLT[48] + VOLT[46] + Vb) / 4;
VOLT[48] = (VOLT[39] + VOLT[49] + VOLT[47] + Vb) / 4;
VOLT[49] = (VOLT[40] + VOLT[50] + VOLT[48] + Vb) / 4;
VOLT[50] = (VOLT[41] + VOLT[51] + VOLT[49] + Vb) / 4;
VOLT[51] = (VOLT[42] + VOLT[52] + VOLT[50] + Vb) / 4;
VOLT[52] = (VOLT[43] + VOLT[53] + VOLT[51] + Vb) / 4;
VOLT[53] = (VOLT[44] + VOLT[54] + VOLT[52] + Vb) / 4;
VOLT[54] = (VOLT[45] + VOLT[55] + VOLT[53] + Vb) / 4;
VOLT[55] = (VOLT[54] + Vc + Vc + Vb) / 4;

```

```

i++; // while dongusu degiskeni arttirir

```

```

for (j = 1; j < 56; j++){ //j=1 den 56 ya kadar devam eder ve j = 56
degerinde donguden cikacak

```

```

hata[j] = VOLT[j] - VOLT_ESKI[j]; //hata degerlerinin hesaplanmasi

```

```

}

```

```
//hata kontrolu yapilir // eger hata 0.01 den kucukse kontrol degiskeni bir
artirilir

//butun degerler dogru olursa kontrol degiskeni 55 olacak
for (k = 1; k < 56; k++){

    if(hata[k] < 0.01){

        kontrol = kontrol + 1;

    }

    //hata bulunursa degerleri tekrar hesapla //eger hata olursa dongu en
basa doner ve tekrar volt degerleri hesaplanir
    else if(hata[k] > 0.01){

        kontrol = 0;

    }

}

//kontrol 55 olursa butun degerler dogru demektir
if(kontrol > 55)
{

    break;

}

}
```

```

printf("iterasyon %d : \n", i);

printf("*****\n");

printf("V1 = %.2f \n", VOLT[1]);

printf("V2=%.2f V3=%.2f \n", VOLT[2],VOLT[3]);

printf("V4=%.2f V5=%.2f V6=%.2f \n", VOLT[4],VOLT[5],VOLT[6]);

printf("V7=%.2f V8=%.2f V9=%.2f V10=%.2f \n",
VOLT[7],VOLT[8],VOLT[9],VOLT[10]);

printf("V11=%.2f V12=%.2f V13=%.2f V14=%.2f V15=%.2f \n",
VOLT[11],VOLT[12],VOLT[13],VOLT[14],VOLT[15]);

printf("V16=%.2f V17=%f V18=%2f V19=%.2f V20=%.2f V21=%.2f \n",
VOLT[16],VOLT[17],VOLT[18],VOLT[19],VOLT[20],VOLT[21]);

printf("V22=%.2f V23=%.2f V24=%.2f V25=%.2f V26=%.2f V27=%f V28=%.2f \n",
VOLT[22],VOLT[23],VOLT[24],VOLT[25],VOLT[26],VOLT[27],VOLT[28]);

printf("V29=%.2f V30=%.2f V31=%.2f V32=%.2f V33=%.2f V34=%.2f V35=%.2f
V36=%.2f \n",
VOLT[29],VOLT[30],VOLT[31],VOLT[32],VOLT[33],VOLT[34],VOLT[35],VOLT[36]);

printf("V37=%.2f V38=%.2f V39=%.2f V40=%.2f V41=%.2f V42=%.2f V43=%.2f
V44=%.2f V45=%.2f \n",
VOLT[37],VOLT[38],VOLT[39],VOLT[40],VOLT[41],VOLT[42],VOLT[43],VOLT[44],V
OLT[45]);

printf("V46=%.2f V47=%.2f V48=%.2f V49=%.2f V50=%.2f V51=%.2f V52=%.2f
V53=%.2f V54=%.2f V55=%.2f \n",
VOLT[46],VOLT[47],VOLT[48],VOLT[49],VOLT[50],VOLT[51],VOLT[52],VOLT[53],V
OLT[54],VOLT[55]);

printf("*****\n\n\n");

printf("***** FEYZANUR BOZTEPE
*****\n");

printf("***** 171110015 *****\n");

return 0;

}

```

```

1  #include <stdio.h>
2
3  int main() {
4
5      printf("ELECTROMAGNETIC MODELLING PROJECT - 1 \n");
6      int i,j,k,kontrol = 0;
7      //kenar voltajlari ve ic voltajlar ilk deger atamasi
8      float VOLT[56] = {0}; //degisken degerler
9      float VOLT_ESKI[56] = {0}; //eski degiskenleri tutacak dizi
10     float Va = 0, Vb = 10, Vc = 20; //kenar voltlari
11     float hata[56] = {0}; //hata dizisi
12
13     //VOLTLARIN HESAPLANMASI
14     while (i < 100){ //i 100 olana kadar yada Break komutu alana kadar döngü devam edecek.
15
16
17         for (j = 1; j < 56; j++){ //j=1 den 56 ya kadar devam eder ve j = 56 degerinde donguden cikacak
18
19             VOLT_ESKI[j] = VOLT[j]; //volt degerleri eski_volt degiskenine atanir
20         }
21
22         //voltajlarin hesaplanmasi
23         VOLT[1] = (Va + Vc + Vc + VOLT[2]) / 4;
24         //*****
25         VOLT[2] = (Va + VOLT[1] + VOLT[3] + VOLT[4]) / 4;
26         VOLT[3] = (VOLT[2] + Vc + Vc + VOLT[5]) / 4;
27         //*****
28         VOLT[4] = (VOLT[2] + VOLT[5] + Va + VOLT[7]) / 4;
29         VOLT[5] = (VOLT[3] + VOLT[4] + VOLT[6] + VOLT[8]) / 4;
30         VOLT[6] = (VOLT[5] + VOLT[9] + Vc + Vc) / 4;
31         //*****
32         VOLT[7] = (VOLT[4] + VOLT[9] + VOLT[11] + Va) / 4;
33         VOLT[8] = (VOLT[5] + VOLT[7] + VOLT[9] + VOLT[12]) / 4;
34         VOLT[9] = (VOLT[6] + VOLT[8] + VOLT[10] + VOLT[13]) / 4;
35         VOLT[10] = (VOLT[9] + VOLT[14] + Vc + Vc) / 4;
36         //*****
37         VOLT[11] = (VOLT[7] + VOLT[12] + VOLT[16] + Va) / 4;
38         VOLT[12] = (VOLT[8] + VOLT[11] + VOLT[13] + VOLT[17]) / 4;
39         VOLT[13] = (VOLT[9] + VOLT[12] + VOLT[14] + VOLT[18]) / 4;
40         VOLT[14] = (VOLT[10] + VOLT[13] + VOLT[15] + VOLT[19]) / 4;
41         VOLT[15] = (VOLT[20] + VOLT[14] + Vc + Vc) / 4;
42         //*****
43         VOLT[16] = (VOLT[11] + VOLT[17] + VOLT[22] + Va) / 4;
44         VOLT[17] = (VOLT[12] + VOLT[16] + VOLT[18] + VOLT[23]) / 4;
45         VOLT[18] = (VOLT[13] + VOLT[17] + VOLT[19] + VOLT[24]) / 4;
46         VOLT[19] = (VOLT[14] + VOLT[18] + VOLT[20] + VOLT[25]) / 4;
47         VOLT[20] = (VOLT[15] + VOLT[19] + VOLT[21] + VOLT[26]) / 4;
48         VOLT[21] = (VOLT[20] + VOLT[27] + Vc + Vc) / 4;
49         //*****
50         VOLT[22] = (VOLT[26] + VOLT[23] + VOLT[29] + Va) / 4;
51         VOLT[23] = (VOLT[17] + VOLT[22] + VOLT[24] + VOLT[30]) / 4;
52         VOLT[24] = (VOLT[18] + VOLT[23] + VOLT[25] + VOLT[31]) / 4;
53         VOLT[25] = (VOLT[19] + VOLT[24] + VOLT[26] + VOLT[32]) / 4;
54         VOLT[26] = (VOLT[20] + VOLT[27] + VOLT[25] + VOLT[33]) / 4;
55
56         VOLT[27] = (VOLT[21] + VOLT[26] + VOLT[28] + VOLT[34]) / 4;
57         VOLT[28] = (VOLT[27] + VOLT[35] + Vc + Vc) / 4;
58         //*****
59         VOLT[29] = (VOLT[22] + VOLT[30] + VOLT[37] + Va) / 4;
60         VOLT[30] = (VOLT[23] + VOLT[29] + VOLT[31] + VOLT[38]) / 4;
61         VOLT[31] = (VOLT[24] + VOLT[30] + VOLT[32] + VOLT[39]) / 4;
62         VOLT[32] = (VOLT[25] + VOLT[33] + VOLT[31] + VOLT[40]) / 4;
63         VOLT[33] = (VOLT[26] + VOLT[32] + VOLT[34] + VOLT[41]) / 4;
64         VOLT[34] = (VOLT[27] + VOLT[35] + VOLT[42] + VOLT[33]) / 4;
65         VOLT[35] = (VOLT[28] + VOLT[34] + VOLT[36] + VOLT[43]) / 4;
66         VOLT[36] = (VOLT[35] + VOLT[44] + Vc + Vc) / 4;
67         //*****
68         VOLT[37] = (VOLT[29] + VOLT[38] + VOLT[46] + Va) / 4;
69         VOLT[38] = (VOLT[30] + VOLT[39] + VOLT[37] + VOLT[47]) / 4;
70         VOLT[39] = (VOLT[31] + VOLT[40] + VOLT[48] + VOLT[38]) / 4;
71         VOLT[40] = (VOLT[32] + VOLT[41] + VOLT[49] + VOLT[39]) / 4;
72         VOLT[41] = (VOLT[33] + VOLT[42] + VOLT[50] + VOLT[40]) / 4;
73         VOLT[42] = (VOLT[34] + VOLT[43] + VOLT[51] + VOLT[41]) / 4;
74         VOLT[43] = (VOLT[35] + VOLT[44] + VOLT[52] + VOLT[42]) / 4;
75         VOLT[44] = (VOLT[36] + VOLT[45] + VOLT[53] + VOLT[43]) / 4;
76         VOLT[45] = (VOLT[54] + VOLT[44] + Vc + Vc) / 4;
77         //*****
78         VOLT[46] = (VOLT[37] + VOLT[47] + Va + Vb) / 4;
79         VOLT[47] = (VOLT[38] + VOLT[48] + VOLT[46] + Vb) / 4;
80         VOLT[48] = (VOLT[39] + VOLT[49] + VOLT[47] + Vb) / 4;
81         VOLT[49] = (VOLT[40] + VOLT[50] + VOLT[48] + Vb) / 4;
82         VOLT[50] = (VOLT[41] + VOLT[51] + VOLT[49] + Vb) / 4;
83         VOLT[51] = (VOLT[42] + VOLT[52] + VOLT[50] + Vb) / 4;
84         VOLT[52] = (VOLT[43] + VOLT[53] + VOLT[51] + Vb) / 4;
85         VOLT[53] = (VOLT[44] + VOLT[54] + VOLT[52] + Vb) / 4;
86         VOLT[54] = (VOLT[45] + VOLT[55] + VOLT[53] + Vb) / 4;
87         VOLT[55] = (VOLT[54] + Vc + Vc + Vb) / 4;

```



```

87
88     i++; // while dongusu degiskeni arttirir
89
90
91     for (j = 1; j < 56; j++){           //j=1 den 56 ya kadar devam eder ve j = 56 degerinde donguden cikacak
92
93         hata[j] = VOLT[j] - VOLT_ESKI[j]; //hata degerlerinin hesaplanmasi
94
95     }
96
97     //hata kontrolu yapilir // eger hata 0.01 den kucukse kontrol degiskeni bir arttirilir
98     //butun degerler dogru olursa kontrol degiskeni 55 olacak
99     for (k = 1; k < 56; k++){
100
101         if(hata[k] < 0.01){
102             kontrol = kontrol + 1;
103
104         }
105         //hata bulunursa degerleri tekrar hesapla //eger hata olursa dongu en bsa doner ve tekrar volt degerleri hesaplanir
106         else if(hata[k] > 0.01){
107             kontrol = 0;
108
109         }
110     }
111
112     //kontrol 55 olursa butun degerler dogru demektir
113     if(kontrol > 55)
114     {
115         break;
116     }
117
118 }
119
120 printf("iterasyon %d : \n", i);
121 printf("*****\n");
122 printf("V1 = %.2f \n", VOLT[1]);
123 printf("V2=%.2f V3=%.2f \n", VOLT[2],VOLT[3]);
124 printf("V4=%.2f V5=%.2f V6=%.2f \n", VOLT[4],VOLT[5],VOLT[6]);
125 printf("V7=%.2f V8=%.2f V9=%.2f V10=%.2f \n", VOLT[7],VOLT[8],VOLT[9],VOLT[10]);
126 printf("V11=%.2f V12=%.2f V13=%.2f V14=%.2f V15=%.2f \n", VOLT[11],VOLT[12],VOLT[13],VOLT[14],VOLT[15]);
127 printf("V16=%.2f V17=%.2f V18=%.2f V19=%.2f V20=%.2f V21=%.2f \n", VOLT[16],VOLT[17],VOLT[18],VOLT[19],VOLT[20],VOLT[21]);
128 printf("V22=%.2f V23=%.2f V24=%.2f V25=%.2f V26=%.2f V27=%.2f V28=%.2f \n", VOLT[22],VOLT[23],VOLT[24],VOLT[25],VOLT[26],VOLT[27],VOLT[28]);
129 printf("V29=%.2f V30=%.2f V31=%.2f V32=%.2f V33=%.2f V34=%.2f V35=%.2f V36=%.2f \n", VOLT[29],VOLT[30],VOLT[31],VOLT[32],VOLT[33],VOLT[34],VOLT[35],VOLT[36]);
130 printf("V37=%.2f V38=%.2f V39=%.2f V40=%.2f V41=%.2f V42=%.2f V43=%.2f V44=%.2f V45=%.2f \n", VOLT[37],VOLT[38],VOLT[39],VOLT[40],VOLT[41],VOLT[42],VOLT[43],VOLT[44],VOLT[45]);
131 printf("V46=%.2f V47=%.2f V48=%.2f V49=%.2f V50=%.2f V51=%.2f V52=%.2f V53=%.2f V54=%.2f V55=%.2f \n", VOLT[46],VOLT[47],VOLT[48],VOLT[49],VOLT[50],VOLT[51],VOLT[52],VOLT[53],VOLT[54],VOLT[55]);
132 printf("*****\n\n\n");
133 printf("***** FEYZANUR BOZTEPE *****\n");
134 printf("***** 171110015 *****\n");
135 return 0;
136 }

```

```

C:\Users\Monster\Desktop\eee_odev\elektromanyetik_modelleme.exe
ELECTROMAGNETIC MODELLING PROJECT - 1
iterasyon 36 :
*****
V1 = 12.14
V2=8.56 V3=15.23
V4=6.89 V5=12.36 V6=16.68
V7=6.63 V8=10.65 V9=14.35 V10=17.46
V11=5.27 V12=9.28 V13=12.63 V14=15.49 V15=17.91
V16=5.20 V17=8.579831 V18=11.434462 V19=13.95 V20=16.17 V21=18.16
V22=6.95 V23=8.42 V24=10.59 V25=12.72 V26=14.67 V27=16.472868 V28=18.21
V29=4.74 V30=7.58 V31=9.80 V32=11.68 V33=13.33 V34=14.86 V35=16.37 V36=18.03
V37=4.44 V38=7.38 V39=9.38 V40=10.88 V41=12.12 V42=13.25 V43=14.41 V44=15.73 V45=17.47
V46=5.64 V47=8.12 V48=9.46 V49=10.34 V50=11.02 V51=11.64 V52=12.27 V53=13.03 V54=14.13 V55=16.03
*****
***** FEYZANUR BOZTEPE *****
***** 171110015 *****

-----
Process exited after 0.06603 seconds with return value 0
Press any key to continue . . .

```