

## BIR JINSLI BO'LGAN IXTIYORIY TEKIS SHAKLNING OG'IRLIK MARKAZINI TOPISH UCHUN DASTURLASH TILLARIDAN FOYDALANISH

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**Annotatsiya:** materiallar qarshiligi tuhunchalari doirasida bir jinsli tekis shaklning og'irlik markazi koordinatalarini va inertsiya momentlarini hisoblash uchun dasturiy vositani yaratish, C++ dasturlash tilidan foydalanib og'irlik markazi koordinatalarini topish.

**Kalit so'zlar:** og'irlik markazi, C++, dasturlash, shakl konturi, sektor, to'g'ri to'rtburchak, uchburchak, aylana.

Ushbu 1-rasmda tasvirlangan tekis shaklning og'irlik markazi koordinatalarini va inertsiya momentlarini hisoblash masalasi qo'yilgan. Shaklning o'lchamlari, konturi rasmda tasvirlangan.

Shaklni bo'laklarga 2 xil uslubda oddiy shakllarga (to'g'ri to'rtburchak, uchburchak, aylana va uning qismlari) ajratamiz va butun shakl konturi bo'ylab bajaramiz. Dastlabki ikkita holda oddiy shakllarning og'irlik markazlarini hisoblash oldindan ma'lum formulalarga asoslangan [1].

1. Bo'laklarga bo'lish usuli. Shakl 5 ta bo'lakka bo'lindi: 2 ta to'g'ri to'rtburchak, 2 ta uchburchak va 1 ta sektor. Ana shu har bir elementning og'irlik markazini hisoblaymiz:

$$1) r = 2; A_1 = \frac{\pi r^2}{4} = \pi = 3,14; x_1 = 2 - 2 \frac{4r}{3\pi} = 1,152; y_1 = 2 + 2 \frac{4r}{3\pi} = 4,848. 2)$$

$$A_2 = 1 \cdot 2 = 2; x_2 = 7; y_2 = 6,5.$$

$$3) A_3 = \frac{1}{2} \cdot 3 \cdot 3 = 4,5; x_3 = \frac{8+8+11}{3} = 9; y_3 = \frac{4+4+1}{3} = 3.$$

$$4) A_4 = \frac{1}{2} \cdot 1 \cdot 2 = 1; x_4 = \frac{2+4+4}{3} = 3,33; y_4 = \frac{1+0+1}{3} = 0,66.$$

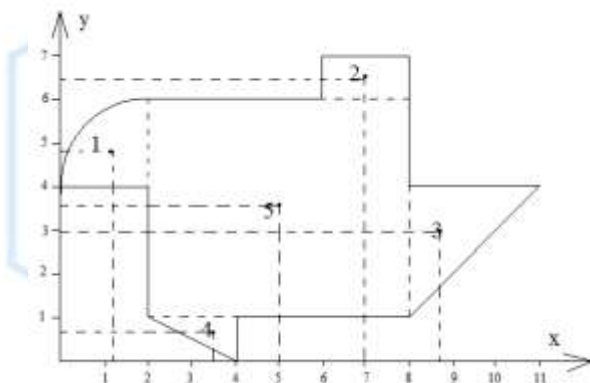
$$5) A_5 = 5 \cdot 6 = 30; x_5 = 5; y_5 = 3,5.$$

$$\text{Umumiy shaklning yuzasi: } A = \sum A_i = 3,14 + 2 + 4,5 + 1 + 30 = 40,642.$$

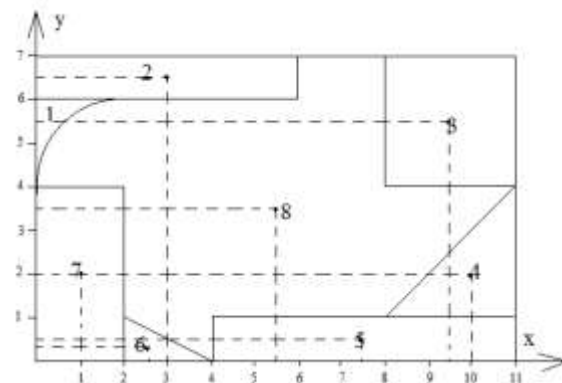
Umumiy shaklning og'irlik markazi koordinatalari:

$$x_c = \frac{\sum A_i x_i}{A} = \frac{3,14 \cdot 1,152 + 2 \cdot 7 + 4,5 \cdot 9 + 1 \cdot 3,33 + 30 \cdot 5}{40,642} = 5,203;$$

$$y_c = \frac{\sum A_i y_i}{A} = \frac{3,14 \cdot 4,848 + 2 \cdot 6,5 + 4,5 \cdot 3 + 1 \cdot 0,667 + 30 \cdot 3,5}{40,642} = 3,626. \quad (1)$$



1-rasm



2-rasm

2. C++ dasturlash tilidan foydalanib og'irlik markazi kordinatalarini topish.

```
#include<iostream.h>
#include<math.h>
int main(float)
{
    int i,n;
    float a[10],x[10],y[10]; float xs,ys,as,xc,yc;
    cout<<"shakillarning og'irlik markazi kordinatalarini kiriting:"<<endl;
    cout<<"shakillarning soni: n="; cin>>n;
    for (i=1;i<=n; i++)
    {cout<<"x["<<i<<"]=";
    cin>>x[i];}
    for (i=1;i<=n; i++)
    {cout<<"y["<<i<<"]=";
    cin>>y[i];}
    for (i=1;i<=n; i++)
    {cout<<"a["<<i<<"]=";
    cin>>a[i];} as=0; xs=0; ys=0;
    for (i=1;i<=n; i++)
    as=as+a[i];
    for (i=1;i<=n; i++) xs=xs+x[i]*a[i];
    for (i=1;i<=n; i++)
    ys=ys+y[i]*a[i];
    xc=xs/as; yc=ys/as;
    cout<<"shakillarning og'irlik markazi kordinatalari"<<endl;
    cout<<"X="<<xc<<endl; cout<<"Y="<<yc<<endl;
```

```
cout<<"shakillarning yuzalari yig'indisi"<<endl;  
cout<<"S="<<as<<endl;  
cout<<"DASTURDAN chiqish uchun birorta tugmani bosing:"<<endl;  
system("PAUSE"); return(0); }
```

C++ dasturlash tilida olingan natijalar.

```
C:\Users\Usser\Desktop\16\Maqola.exe  
shakillarning og'irlik markazi kordinatalarini kiriting:  
shakillarning soni: n=5  
x[1]=1.152  
x[2]=7  
x[3]=9  
x[4]=3.33  
x[5]=5  
y[1]=4.848  
y[2]=6.5  
y[3]=3  
y[4]=0.66  
y[5]=3.5  
a[1]=3.14  
a[2]=2  
a[3]=4.5  
a[4]=1  
a[5]=30  
shakillarning og'irlik markazi kordinatalari  
X=5.20294  
Y=3.62654  
shakillarning yuzalari yig'indisi  
S=40.64  
DASTURDAN chiqish uchun birorta tugmani bosing:  
Для продолжения нажмите любую клавишу . . .
```

Ushbu hisoblash uslubi va dasturidan materiallar qarshiligi fani va turdosh fanlar doirasidagi amaliy masalarni yechishda foydalanish mumkin.

### Adabiyotlar

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2. Кирсанов М.Н. Решебник. Теоретическая механика. – М.: Физматлит, 2002. – 384 с.
3. Х.Дейтел, П.Дейтел. Как программировать на С++. – М.: БИНОМ,2000.
4. У.Топп, У.Форд. Структуры данных в С++. – М.: БИНОМ,2000.