

Python ile 2B kafes analizi

Kafes yapı ile oluşturulan 2 boyutlu tüm geometrilerilerin analizini yapmak için hazırlandı.

MainWindow

Material Data Geometry Boundry Conditions Solve

Material Name Young Module (E)[MPa]

A-36 steel 200000

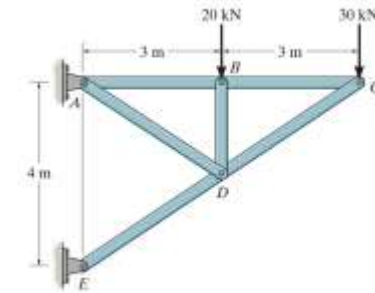
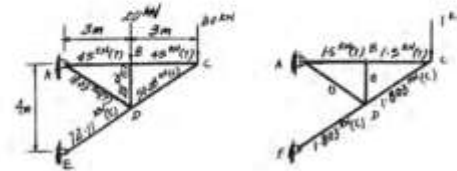
14-75. Determine the vertical displacement of joint C on the truss. Each A-36 steel member has a cross-sectional area of $A = 300 \text{ mm}^2$.

Member	n	N	L	nNL
AB	1.50	45.0	3	202.5
AD	0	18.03	$\sqrt{13}$	0
BC	1.50	45.0	3	202.5
BD	0	-20.0	2	0
CD	-1.803	-54.08	$\sqrt{13}$	351.56
DE	-1.803	-72.11	$\sqrt{13}$	468.77

$$\Sigma = 1225.33$$

$$1 \cdot \Delta_C = \frac{\Sigma nNL}{AE}$$

$$\Delta_C = \frac{1225.33(10^3)}{300(10^{-6})(200)(10^9)} = 0.0204 \text{ m} = 20.4 \text{ mm}$$



Ans.

Python ile 2B kafes analizi

- Sistemin geometrisini elemanların koornidatlarını yazarak tanımlıyoruz.
Elemanlar veya koordinat değeri istenilen sırayla girilebilir.
Kullanıcı vasıtasıyla Oluşabilecek bug lar engellendi.

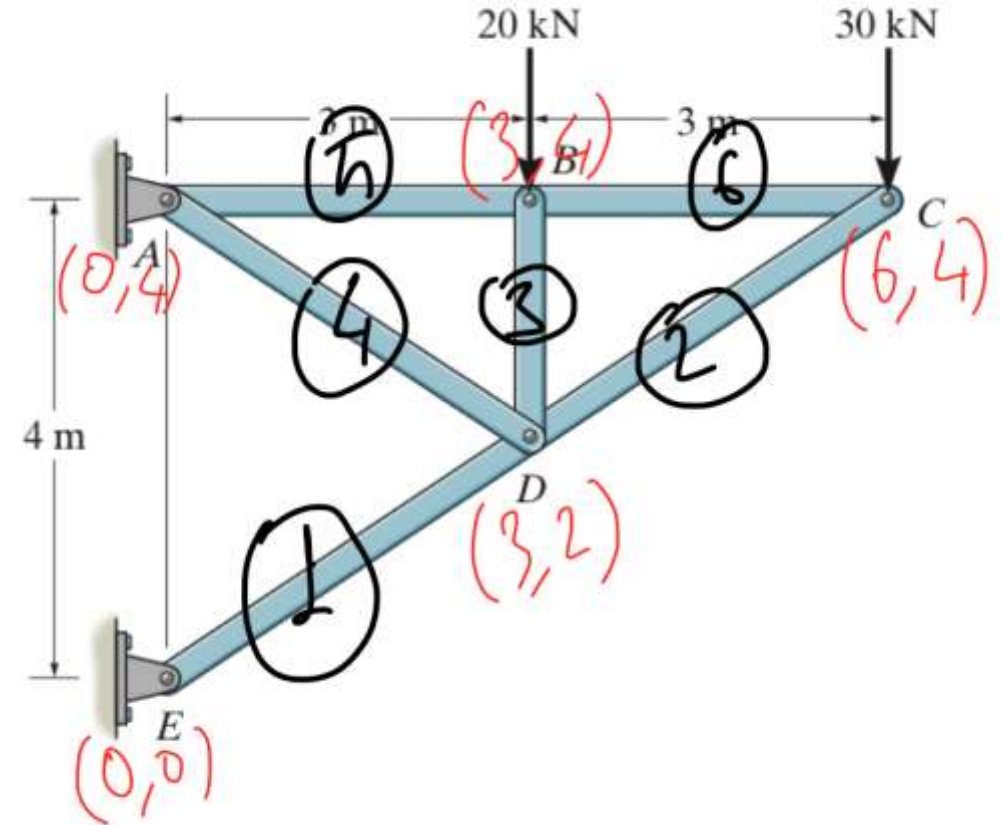
MainWindow

Material Data Geometry Boundry Conditions Solve

	Node 1	Node 2
Element 1	<input type="text" value="0"/> <input type="text" value="0"/>	<input type="text" value="3000"/> <input type="text" value="2000"/>
Element 2	<input type="text" value="3000"/> <input type="text" value="2000"/>	<input type="text" value="6000"/> <input type="text" value="4000"/>
Element 3	<input type="text" value="3000"/> <input type="text" value="2000"/>	<input type="text" value="3000"/> <input type="text" value="4000"/>
Element 4	<input type="text" value="3000"/> <input type="text" value="2000"/>	<input type="text" value="0"/> <input type="text" value="4000"/>
Element 5	<input type="text" value="0"/> <input type="text" value="4000"/>	<input type="text" value="3000"/> <input type="text" value="4000"/>
Element 6	<input type="text" value="3000"/> <input type="text" value="4000"/>	<input type="text" value="6000"/> <input type="text" value="4000"/>

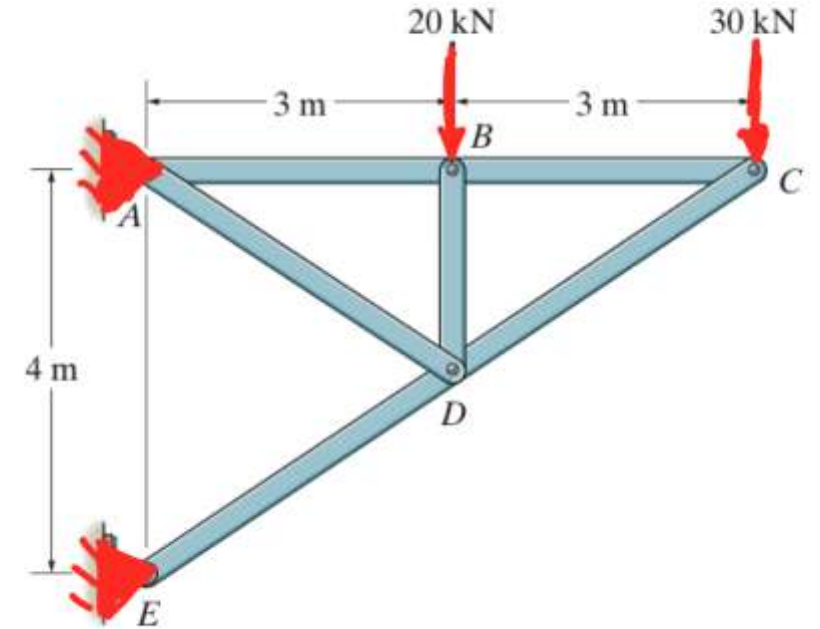
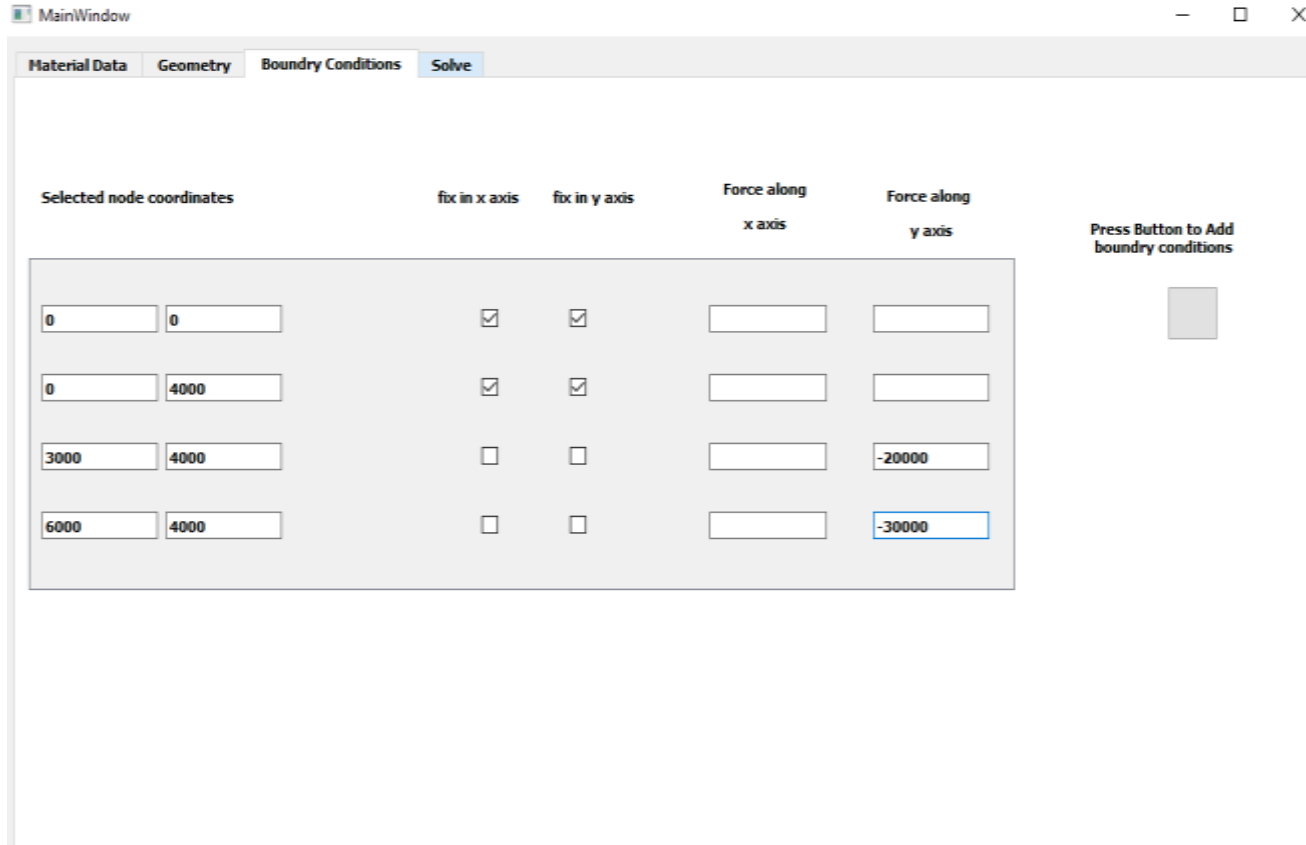
Press Button to Add Elements

Cross-sectional area[mm²]



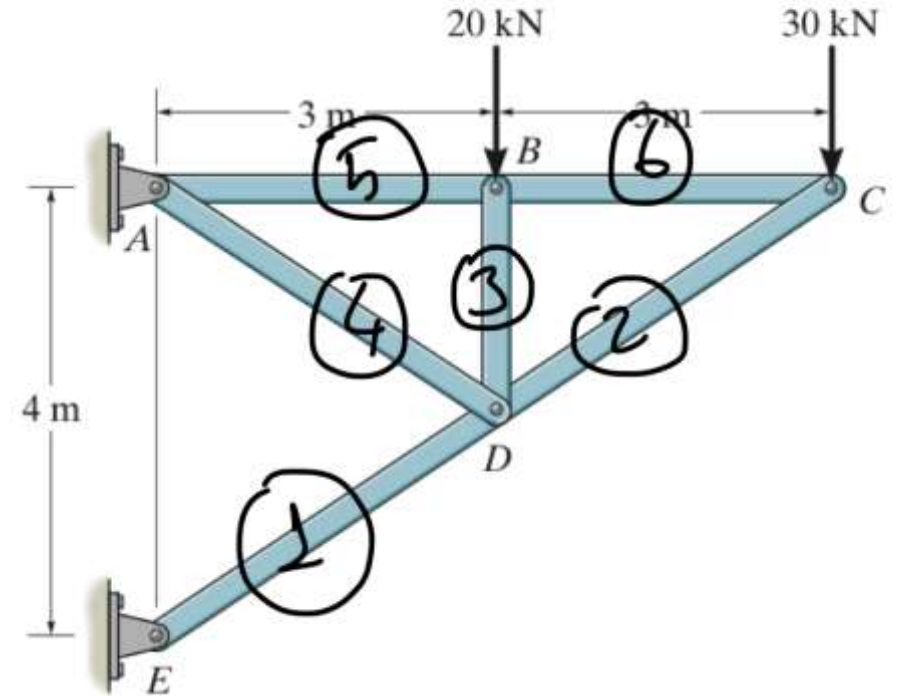
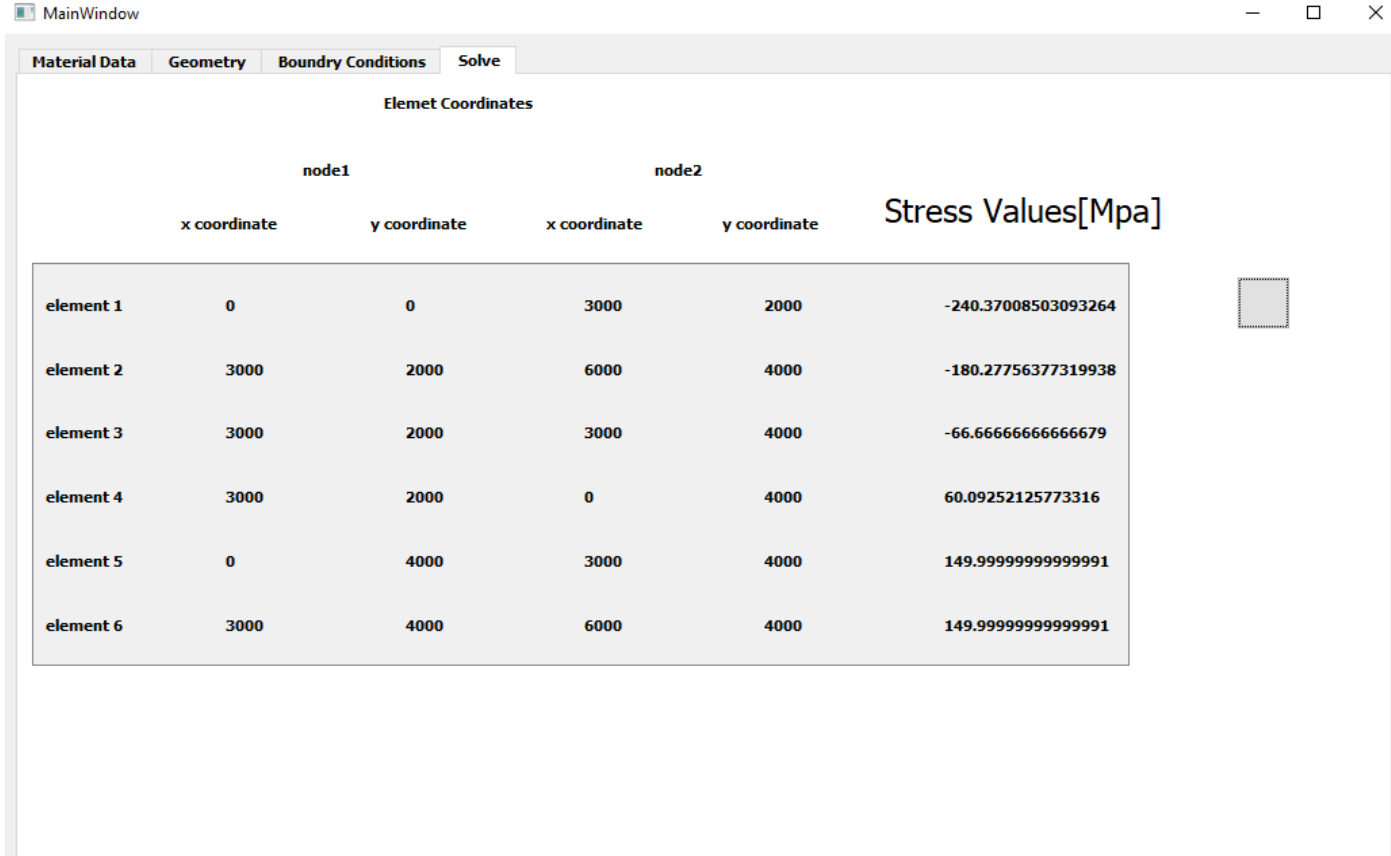
Python ile 2B kafes analizi

- Sınır koşullarını atıyoruz



Python ile 2B kafes analizi

- Sonuçların ekranda gösterilmesi



Doğruluk testi

- Bu sorunun çözümünde stress değerleri yerine noktaların yer değiştirmeleri sorulmuştu. Programı tekrardan değiştirmek yerine
- Yer değiştirme değerlerini terminal den yazdırdım.
- Programın doğru çalışıp çalışmadığını kontrol edebiliriz.

```

308 for i in range(1,len(self.x1)):
309
310     self.vektor = np.array([-self.cc[i]
311
312     if len(self.x1[i]) != 0 and len(self
313         dis = [0,0,0,0]
314         disi = [2*self.nlg[i]-2,2*self
315         disi = sorted(disi)
316
317
318     for k in range(len(self.odof))
319

```

```

force vektor
[ 0.  0.  0.  0.  0. -30000.  0. -20000.  0.
 0.]

```

```

DOF vektor
[0, 8, 1, 9]
Displacements of the nodes
[-1.95300694 -4.88251735 4.5 -20.42104859 2.25
 -5.54918402]
[-240.37008503093264]

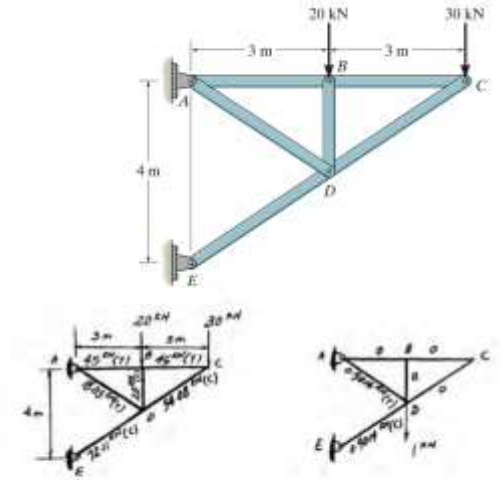
```

*14-76. Determine the vertical displacement of joint D on the truss. Each A-36 steel member has a cross-sectional area of $A = 300 \text{ mm}^2$.

Member	n	N	L	nNL
AB	0	45.0	3	0
AD	0.9014	18.03	$\sqrt{13}$	58.60
BC	0	45.0	3	0
BD	0	-20.0	2	0
CD	0	-54.08	$\sqrt{13}$	0
DE	-0.9014	-72.11	$\sqrt{13}$	234.36
				$\Sigma = 292.96$

$$1 \cdot \Delta_D = \frac{\Sigma nNL}{AE}$$

$$\Delta_D = \frac{292.96(10^3)}{300(10^{-6})(200)(10^9)} = 4.88(10^{-3}) \text{ m} = 4.88 \text{ mm}$$



Ans.

14-75. Determine the vertical displacement of joint C on the truss. Each A-36 steel member has a cross-sectional area of $A = 300 \text{ mm}^2$.

Member	n	N	L	nNL
AB	1.50	45.0	3	202.5
AD	0	18.03	$\sqrt{13}$	0
BC	1.50	45.0	3	202.5
BD	0	-20.0	2	0
CD	-1.803	-54.08	$\sqrt{13}$	351.56
DE	-1.803	-72.11	$\sqrt{13}$	468.77
				$\Sigma = 1225.33$

$$1 \cdot \Delta_C = \frac{\Sigma nNL}{AE}$$

$$\Delta_C = \frac{1225.33(10^3)}{300(10^{-6})(200)(10^9)} = 0.0204 \text{ m} = 20.4 \text{ mm}$$

Ans.

