

```

In[1]:= Iz = 25170 / 100000000 // N
Out[1]= 0.0002517

In[2]:= (* E = 2*10^8 kN/m^2, Iz = 0.0002517 m^4*)
In[3]:= EI = 2.0 * 10^8 * Iz // N
Out[3]= 50340.

In[4]:= Pcr = (2.0 * 10^8 * Pi^2 * Iz) / (4 * 4^2)
Out[4]= 7763.06

In[5]:= L = 6; h = 4; Kh = 120; Kv = 1000; Nl = 968.0; Ng = 60.0; Nd = 1032.0;

In[6]:= M12 = ( (2 * EI / h + h * Nl / 30) * fi2 + ( (6 * EI / h^2 - Nl / 10) * u
Out[6]= 25299.1 fi2 + 18780.7 u

In[7]:= M21 = ( (4 * EI / h - 2 * h * Nl / 15) * fi2 + ( (6 * EI / h^2 - Nl / 10) * u
Out[7]= 49823.7 fi2 + 18780.7 u

In[8]:= M23 = ( (4 * EI / L - 2 * L * Ng / 15) * fi2 + ( (2 * EI / L + L * Ng / 30) * fi3
Out[8]= 33512. fi2 + 16792. fi3

In[9]:= M32 = ( (4 * EI / L - 2 * L * Ng / 15) * fi3 + ( (2 * EI / L + L * Ng / 30) * fi2
Out[9]= 16792. fi2 + 33512. fi3

In[10]:= M34 = ( (4 * EI / h - 2 * h * Nd / 15) * fi3 + ( (6 * EI / h^2 - Nd / 10) * u
Out[10]= 49789.6 fi3 + 18774.3 u

In[11]:= M43 = ( (2 * EI / h + h * Nd / 30) * fi3 + ( (6 * EI / h^2 - Nd / 10) * u
Out[11]= 25307.6 fi3 + 18774.3 u

In[12]:= (*Uvjeti ravnoteze u cvorovima...*)
In[13]:= M21 + M23
Out[13]= 83335.7 fi2 + 16792. fi3 + 18780.7 u

In[14]:= M32 + M34
Out[14]= 16792. fi2 + 83301.6 fi3 + 18774.3 u

In[15]:= (*Jednadzba virtualnog rada...*)
In[16]:= (M21 + M12) * (u / h) + (M34 + M43) * (u / h) + (-Kh * u - Kv * u * 2 * (u / h))
Out[16]= -120 u - 500 u^2 + (1/4) u (75097.2 fi3 + 37548.6 u) + (1/4) u (75122.8 fi2 + 37561.4 u)

In[17]:= (*Rjesenje sustava tri jednadzbe, dvije momentne i virtualni rad...*)

```

```
In[18]:= Solve[{{M21 + M23 == 0, M32 + M34 == 0, -120 u - 500 u^2 +  $\frac{1}{4}$  u (75097.2` fi3 + 37548.6` u) +  $\frac{1}{4}$  u (75122.79999999999` fi2 + 37561.4` u) == 0}, {fi2, fi3, u}]
```

```
Out[18]:= {{fi2 → -0.00200367, fi3 → -0.00200367, u → 0.0106824}, {fi2 → 0., fi3 → 0., u → 0.}}
```

```
In[19]:= (*Prvi skup rjesenja je mjerodavan...*)
```

```
In[20]:= (*Momenti u cvorovima...*)
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```
In[21]:= M12 /. {fi2 → -0.0020036746017644018`,  
             fi3 → -0.002003674971316943`, u → 0.010682424106543695`}
```

```
Out[21]= 149.932
```

```
In[22]:= M21 /. {fi2 → -0.0020036746017644018`,  
             fi3 → -0.002003674971316943`, u → 0.010682424106543695`}
```

```
Out[22]= 100.793
```

```
In[23]:= M23 /. {fi2 → -0.0020036746017644018`,  
             fi3 → -0.002003674971316943`, u → 0.010682424106543695`}
```

```
Out[23]= -100.793
```

```
In[24]:= M32 /. {fi2 → -0.0020036746017644018`,  
             fi3 → -0.002003674971316943`, u → 0.010682424106543695`}
```

```
Out[24]= -100.793
```

```
In[25]:= M34 /. {fi2 → -0.0020036746017644018`,  
             fi3 → -0.002003674971316943`, u → 0.010682424106543695`}
```

```
Out[25]= 100.793
```

```
In[26]:= M43 /. {fi2 → -0.0020036746017644018`,  
             fi3 → -0.002003674971316943`, u → 0.010682424106543695`}
```

```
Out[26]= 149.847
```