finite_difference_method

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[2]:
```
import numpy as np
```

Dane:

[3]:
```
l = 0.1 # wysokość i szerokość objętości skończonej, m
k = 1.4 # W/m/K
hi = 75 # W/m2/K
Ti = 280+273.15 # K
h0 = 18 # W/m2/K
T0 = 15+273.15 # K
Tsurr = 250 # K
epsi = 0.9
sigma = 5.67*10**(-8) # W/m2/K4
```

[7]:
```
A = np.array([[-h0*l-2*k, k, 0, 0, k, 0, 0, 0, 0, 0],
              [k/2, -h0*l-2*k, k/2, 0, 0, k, 0, 0, 0, 0],
              [0, k/2, -h0*l-2*k, k/2, 0, 0, k, 0, 0, 0],
              [0, 0, k/2, -h0*l-k, 0, 0, 0, k/2, 0, 0],
              [k/2, 0, 0, 0, -hi*l/2-k, k/2, 0, 0, 0, 0],
              [0, k, 0, 0, k/2, -hi*l-2*k, k/2, 0, 0, 0],
              [0, 0, k, 0, 0, k/2, -hi*l-3*k, k, k/2, 0],
              [0, 0, 0, k/2, 0, 0, k, -h0*l-2*k, 0, k/2],
              [0, 0, 0, 0, 0, 0, k/2, 0, -hi*l/2-k, k/2],
              [0, 0, 0, 0, 0, 0, 0, k/2, k/2, -h0*l/2-k]])
```

[8]:
```
print(A)
```

```
[[ -4.6    1.4    0.     0.     1.4    0.     0.     0.     0.     0.  ]
 [  0.7   -4.6    0.7    0.     0.     1.4    0.     0.     0.     0.  ]
 [  0.     0.7   -4.6    0.7    0.     0.     1.4    0.     0.     0.  ]
 [  0.     0.     0.7   -3.2    0.     0.     0.     0.7    0.     0.  ]
 [  0.7    0.     0.     0.    -5.15   0.7    0.     0.     0.     0.  ]
 [  0.     1.4    0.     0.     0.7  -10.3    0.7    0.     0.     0.  ]
 [  0.     0.     1.4    0.     0.     0.7  -11.7    1.4    0.7    0.  ]
 [  0.     0.     0.     0.7    0.     0.     1.4   -4.6    0.     0.7 ]
 [  0.     0.     0.     0.     0.     0.     0.7    0.    -5.15   0.7 ]
 [  0.     0.     0.     0.     0.     0.     0.     0.7    0.7   -2.3 ]]
```

[9]:
```
B = np.array([
    [-h0*l*T0],
    [-h0*l*T0],
    [-h0*l*T0],
    [-h0*l*T0],
    [-hi*l*Ti/2],
    [-hi*l*Ti],
    [-hi*l*Ti],
    [-h0*l*T0],
    [-hi*l*Ti/2],
    [-h0*l*T0/2]
])
```

[10]:
```
print(B)
```

```
[[ -518.67  ]
 [ -518.67  ]
 [ -518.67  ]
 [ -518.67  ]
 [-2074.3125]
 [-4148.625 ]
 [-4148.625 ]
 [ -518.67  ]
 [-2074.3125]
 [ -259.335 ]]
```

[11]:
```
T_distribution = np.dot(
    np.linalg.inv(A),B
)
```

[13]:
```
print("Rozkład temperatur, K")
print(T_distribution)
```

```
Rozkład temperatur, K
[[391.93808002]
 [389.75793671]
 [376.18535407]
 [326.56278598]
 [527.56004049]
 [526.09293215]
 [507.39865916]
 [375.71595327]
 [524.30347057]
 [386.67330291]]
```

[ ]: