```matlab
clc;clear;close all;

L = 10;
n_segments = 100;
n_nodes = n_segments + 1;
dx = L / n_segments;
h_prime = 0.02;
T_a = 20;
T_0 = 40;
T_L = 200;

alpha = h_prime * dx^2;  % محاسبه مقدار ثابت در معادله

A = zeros(n_nodes, n_nodes);
b = zeros(n_nodes, 1);

b(1) = T_0;
b(end) = T_L;

for i = 2:n_nodes-1
    A(i, i-1) = -1;
    A(i, i) = 2 + alpha;
    A(i, i+1) = -1;
    b(i) = alpha * T_a;
end

A(1, 1) = 1;
A(end, end) = 1;

T = A \ b;   % ضربدر بی همان (معکوس آ)

x_positions = linspace(0, L, n_nodes);

fprintf('دما            موقعیت\n');
for i = 1:n_nodes
    fprintf('%.2f    %.4f\n', x_positions(i), T(i));
end

figure;
plot(x_positions, T, '-o', 'LineWidth', 1.5);
xlabel('موقعیت روی میله (متر)');
ylabel('دما (C)');
title('توزیع دما در طول میله');
grid on;
```

```
دما            موقعیت
40.0000    0.00
40.9992    0.10
42.0025    0.20
43.0103    0.30
44.0227    0.40
45.0398    0.50
46.0620    0.60
```
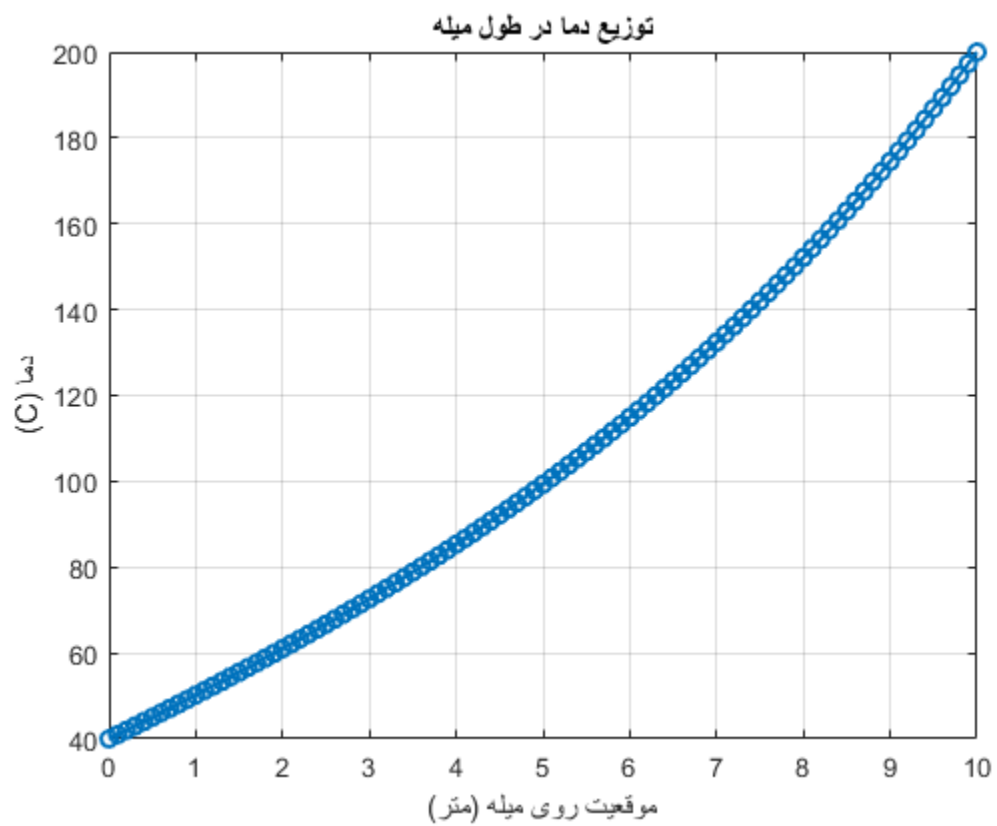
```
47.0894     0.70
48.1222     0.80
49.1607     0.90
50.2049     1.00
51.2552     1.10
52.3118     1.20
53.3748     1.30
54.4445     1.40
55.5211     1.50
56.6048     1.60
57.6958     1.70
58.7943     1.80
59.9006     1.90
61.0149     2.00
62.1374     2.10
63.2683     2.20
64.4079     2.30
65.5564     2.40
66.7139     2.50
67.8808     2.60
69.0573     2.70
70.2436     2.80
71.4400     2.90
72.6466     3.00
73.8638     3.10
75.0917     3.20
76.3307     3.30
77.5809     3.40
78.8426     3.50
80.1161     3.60
81.4016     3.70
82.6994     3.80
84.0098     3.90
85.3329     4.00
86.6692     4.10
88.0187     4.20
89.3819     4.30
90.7589     4.40
92.1501     4.50
93.5557     4.60
94.9760     4.70
96.4113     4.80
97.8619     4.90
99.3281     5.00
100.8101    5.10
102.3083    5.20
103.8230    5.30
105.3544    5.40
106.9029    5.50
108.4688    5.60
110.0524    5.70
111.6540    5.80
113.2739    5.90
114.9124    6.00
```

```
116.5700     6.10
118.2469     6.20
119.9434     6.30
121.6599     6.40
123.3967     6.50
125.1542     6.60
126.9328     6.70
128.7327     6.80
130.5544     6.90
132.3982     7.00
134.2644     7.10
136.1536     7.20
138.0659     7.30
140.0019     7.40
141.9618     7.50
143.9462     7.60
145.9553     7.70
147.9897     7.80
150.0496     7.90
152.1356     8.00
154.2479     8.10
156.3872     8.20
158.5537     8.30
160.7479     8.40
162.9702     8.50
165.2212     8.60
167.5012     8.70
169.8107     8.80
172.1501     8.90
174.5200     9.00
176.9208     9.10
179.3530     9.20
181.8171     9.30
184.3135     9.40
186.8427     9.50
189.4054     9.60
192.0019     9.70
194.6328     9.80
197.2987     9.90
200.0000    10.00
```

توزیع دما در طول میله

Published with MATLAB® R2023b