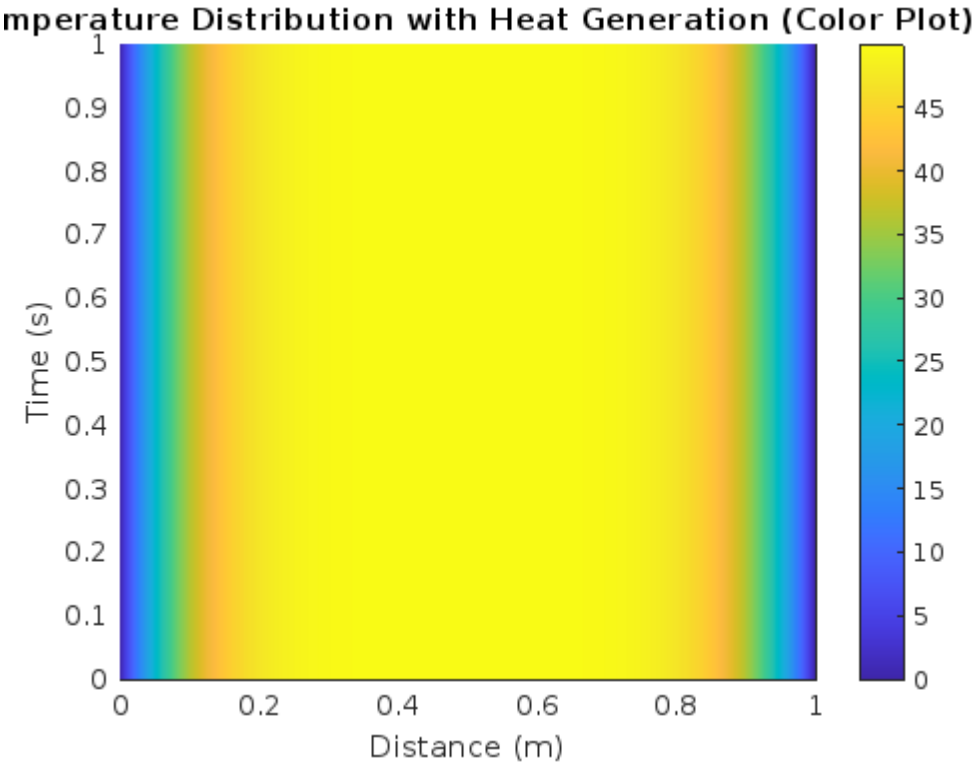
```
clc
clear all
% Parameters
L = 1;              % Length of the rod
Nx = 50;            % Number of spatial grid points
dx = L / (Nx - 1);  % Spatial step size
timesteps = 1000;   % Number of time steps
alpha = 0.01;       % Thermal diffusivity
Q = 50;              % Heat generation rate (constant)

% Define initial temperature distribution
T = zeros(Nx, 1);
T_left = 0;         % Temperature at the left boundary
T_right = 0;        % Temperature at the right boundary
T(1) = T_left;
T(Nx) = T_right;

% Finite difference scheme
dt = 0.001;         % Time step
for n = 1:timesteps
    T_new = T;
    for i = 2:Nx-1
        % Finite difference formula for heat generation
        T_new(i) = T(i) + alpha * dt / dx^2 * (T(i+1) - 2*T(i) + T(i-1)) + Q * dt;
    end
    T = T_new;
end

% Create meshgrid for plotting
x = linspace(0, L, Nx);
t = linspace(0, timesteps*dt, timesteps);  % Time array for color plot
[T_plot, X] = meshgrid(T, t);  % Create 2D grid for color plot

% Plotting the temperature distribution as a color plot
figure;
pcolor(x, t, T_plot);
shading interp;  % Interpolate colors for smoother plot
xlabel('Distance (m)');
ylabel('Time (s)');
title('Temperature Distribution with Heat Generation (Color Plot)');
colorbar;
```



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