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% Parameters
L = 100; % Length of the plate (in meters)
N = 100; % Number of grid points in each dimension
dx = L / (N - 1); % Grid spacing
dt = 0.01; % Time step (choose small enough for stability)

% Initial conditions
T = zeros(N, N); % Initial temperature distribution
T(:) = 0; % Initial temperature is 0 everywhere
T(:, 1) = 100; % Left boundary at 100°C
T(:, end) = 100; % Right boundary at 100°C
T(1, :) = 100; % Top boundary at 100°C
T(end, :) = 100; % Bottom boundary at 100°C
T(N/2, N/2) = -100; % Center cooled at -100°C

% Thermal conductivity
k = 1;

% Simulation
total_time = 100; % Total simulation time (seconds)
num_steps = total_time / dt; % Number of time steps
for t = 1:num_steps
    % Compute temperature distribution using finite difference method
    T_new = T;
    for i = 2:N-1
        for j = 2:N-1
            T_new(i, j) = T(i, j) + (k*dt/(dx^2)) * (T(i+1, j) + T(i-1, j) +
T(i, j+1) + T(i, j-1) - 4*T(i, j));
        end
    end
    T = T_new;
end

% Plotting
[X, Y] = meshgrid(linspace(0, L, N), linspace(0, L, N));
surf(X, Y, T);
title('Temperature Distribution on Plate After 100 Seconds');
xlabel('X (m)');
ylabel('Y (m)');
zlabel('Temperature (°C)');
colorbar;

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Temperature Distribution on Plate After 100 Seconds

