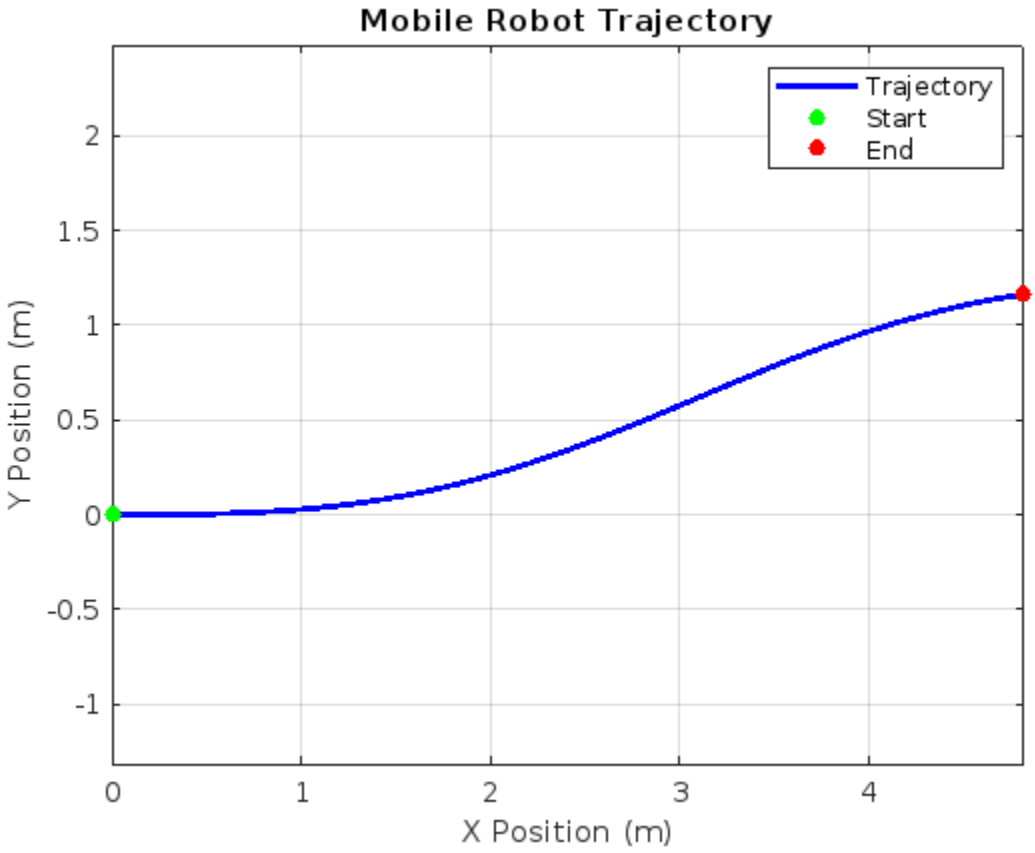
```
% Mobile Robot Kinematic Model Simulation
clc;
clear;
close all;

% Simulation Parameters
dt = 0.1; % Time step (s)
T = 10;   % Total simulation time (s)
t = 0:dt:T; % Time vector

% Initial Conditions
x = 0;   % Initial x position (m)
y = 0;   % Initial y position (m)
theta = 0; % Initial orientation (radians)

% Control Inputs (Define v and omega as a function of time)
v = 0.5 * ones(size(t));          % Constant linear velocity (m/s)
omega = 0.1 * sin(0.5 * t);       % Angular velocity (rad/s)

% Preallocate arrays for trajectory
x_traj = zeros(size(t));
y_traj = zeros(size(t));
theta_traj = zeros(size(t));

% Simulation Loop
for k = 1:length(t)
    % Store current state
    x_traj(k) = x;
    y_traj(k) = y;
    theta_traj(k) = theta;

    % Kinematic model equations
    dx = v(k) * cos(theta);
    dy = v(k) * sin(theta);
    dtheta = omega(k);

    % Update state using Euler's method
    x = x + dx * dt;
    y = y + dy * dt;
    theta = theta + dtheta * dt;
end

% Plot the trajectory
figure;
plot(x_traj, y_traj, 'b-', 'LineWidth', 2);
hold on;
scatter(x_traj(1), y_traj(1), 'go', 'filled'); % Starting point
scatter(x_traj(end), y_traj(end), 'ro', 'filled'); % End point
grid on;
xlabel('X Position (m)');
ylabel('Y Position (m)');
title('Mobile Robot Trajectory');
```

```
legend('Trajectory', 'Start', 'End');
axis equal;
```




*Published with MATLAB® R2024b*