Contents

Doppler Effect Simulation

```
clc;
clear;
close all;
```

Parameters

```
frequency = 2.4e9;                          % Frequency of the transmitted signal (Hz)
speed_of_light = 3e8;                       % Speed of light (m/s)
velocity_receiver = 10;                     % Velocity of the receiver (m/s)
distance = 1000;                            % Distance between transmitter and receiver (m)
wavelength = speed_of_light / frequency;    % Wavelength of the signal (m)
```

Define time vector

```
t = linspace(0, 10, 100); % Time varying from 0 to 10 seconds
```

Initialize arrays to store Doppler shift for different values of theta

```
doppler_shift_increasing = zeros(size(t));
doppler_shift_decreasing = zeros(size(t));
doppler_shift_constant = zeros(size(t));
```

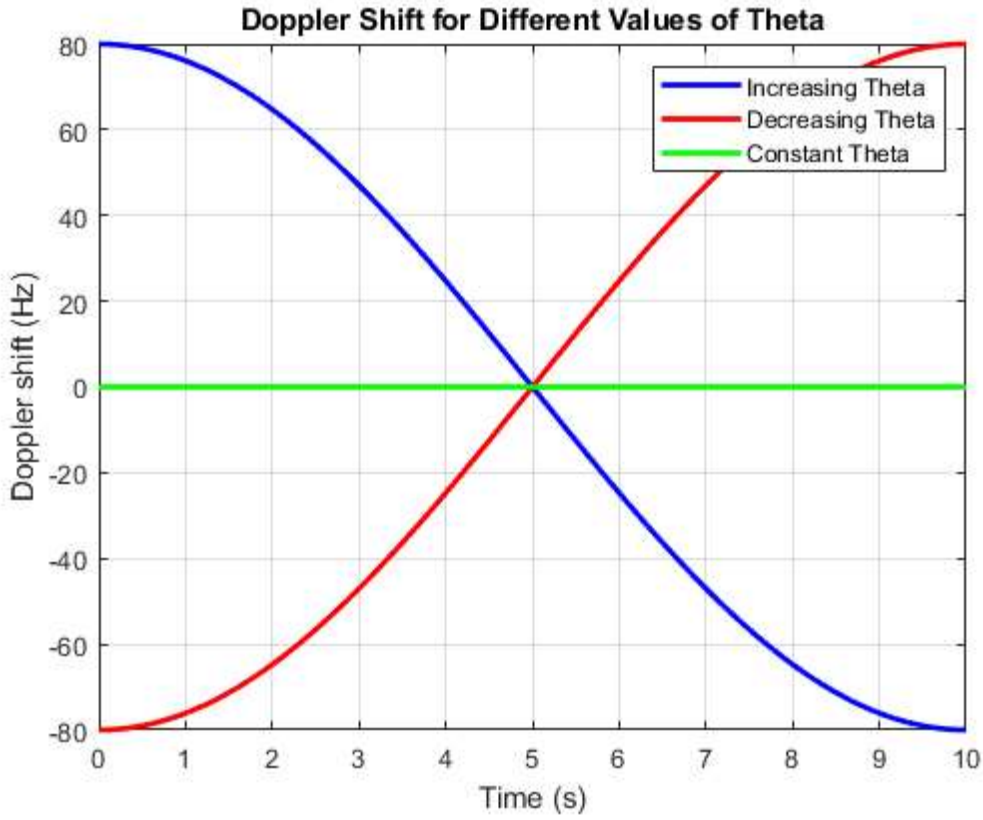
Calculate Doppler shift for each time step

```
for i = 1:length(t)
    % Calculate theta for each time step
    theta_increasing = pi * t(i) / 10;      % Increasing theta
    theta_decreasing = pi - pi * t(i) / 10; % Decreasing theta
    theta_constant = pi / 2;                % Constant theta

    % Calculate Doppler shift for each theta
    doppler_shift_increasing(i) = (velocity_receiver / wavelength) * cos(theta_increasing);
    doppler_shift_decreasing(i) = (velocity_receiver / wavelength) * cos(theta_decreasing);
    doppler_shift_constant(i) = (velocity_receiver / wavelength) * cos(theta_constant);
end
```

Plot Doppler shift for different values of theta

```
figure;
plot(t, doppler_shift_increasing, 'b', 'Linewidth', 2);
hold on;
plot(t, doppler_shift_decreasing, 'r', 'Linewidth', 2);
plot(t, doppler_shift_constant, 'g', 'Linewidth', 2);
xlabel('Time (s)');
ylabel('Doppler shift (Hz)');
title('Doppler Shift for Different Values of Theta');
legend('Increasing Theta', 'Decreasing Theta', 'Constant Theta');
grid on;
```



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