**MATLAB Code for Single T-Shaped Antenna Array**

% Define the constants and substrate properties

epsilon\_r = 4.4; % Relative permittivity of the FR4 substrate

h = 1.6e-3; % Height of the substrate in meters (1.6 mm)

c = 3e8; % Speed of light in vacuum (m/s)

f = 2.4e9; % Operating frequency (e.g., 2.4 GHz for Wi-Fi)

% Calculate the wavelength in the substrate

lambda = c / f / sqrt(epsilon\_r);

% Define the dimensions of the T-shaped patch antenna

L = 1.57e-3; % Length of the patch in meters

W = 3.17e-3; % Width of the patch in meters

feed\_length = 3.590600e-3; % Length of the feed line in meters

feed\_width = 0.972119e-3; % Width of the feed line in meters

% Calculate effective dielectric constant for microstrip line

epsilon\_eff = (epsilon\_r + 1)/2 + (epsilon\_r - 1)/2 \* (1 + 12 \* (h/feed\_width))^(-1/2);

% Calculate the impedance of the microstrip line using Wheeler's formula

Z0 = 60\*log((8\*h/feed\_width) + (feed\_width/(4\*h))) / sqrt(epsilon\_eff);

% Plotting the patch and the feed line

figure;

hold on;

% Plot the rectangular patch

rectangle('Position', [-L/2, -W/2, L, W], 'FaceColor', [1 0 0]);

% Plot the feed line

rectangle('Position', [-feed\_length/2, -feed\_width/2, feed\_length, feed\_width], 'FaceColor', [0 0 1]);

% Set plot limits and aspect ratio

axis equal;

xlim([-2\*L 2\*L]);

ylim([-2\*W 2\*W]);

title('T-Shaped Microstrip Patch Antenna Layout');

xlabel('Length (m)');

ylabel('Width (m)');

grid on;

hold off;