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% AER1403 Assignment 8 Q1

x = [0 1 1 0];
y = [0 0 1 1];

x_disp = [0.02 0.05 0.02 -0.02];
y_disp = [-0.01 0.02 0.04 0.01];

zeta_vals = -1:0.1:1;
eta_vals = -1:0.1:1;

x_vals = 0:0.05:1;
y_vals = 0:0.05:1;

disp_mat_x = zeros(length(zeta_vals),length(eta_vals));
disp_mat_y = zeros(length(zeta_vals),length(eta_vals));

for i = 1:length(zeta_vals)
    for j = 1:length(eta_vals)

        zeta = zeta_vals(i);
        eta = eta_vals(j);

        N1 = 0.25*(1 - zeta)*(1 - eta);
        N2 = 0.25*(1 + zeta)*(1 - eta);
        N3 = 0.25*(1 + zeta)*(1 + eta);
        N4 = 0.25*(1 - zeta)*(1 + eta);

        inter_disp = [N1 N2 N3 N4]*[x_disp' y_disp'];
        disp_mat_x(j,i) = inter_disp(1);
        disp_mat_y(j,i) = inter_disp(2);

    end
end

[X,Y] = meshgrid(x_vals,y_vals);

contourf(X,Y,disp_mat_x,10,'-.','ShowText','on')
xlabel('X-Axis')
ylabel('Y-Axis')
colorbar
```