**Appendix**

**Matlab code**

% finite element method

r = [0,0.25,0.5,0.75,1];

A = [8 -4 0;

-4 8 -4;

0 -4 8;];

B = [1/24 1/64 0;

1/64 1/12 5/192;

0 5/192 1/8;];

b = [-0.25;-0.25;-0.25];

% solve Aa + Ba = b

a = (A+B)\b

% plot

x = 0:0.01:1;

ux = [a(1).\*phi(0,0.25,0.5,x)+ a(2).\*phi(0.25,0.5,0.75,x)+ a(3).\*phi(0.5,0.75,1, x)];

plot(x,ux)

% function phi(x)

function [ ux ] = phi( xi\_1, xi, xi1,x )

ux = zeros(1,length(x));

for i = 1:length(x)

if x(i) < xi\_1 || x(i) > xi1

ux(i) = 0;

elseif x(i) < xi

ux(i) = (x(i) - xi\_1) ./ (xi - xi\_1);

else

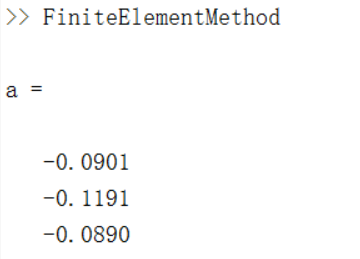
ux(i) = (xi1 - x(i)) ./ (xi1 - xi);

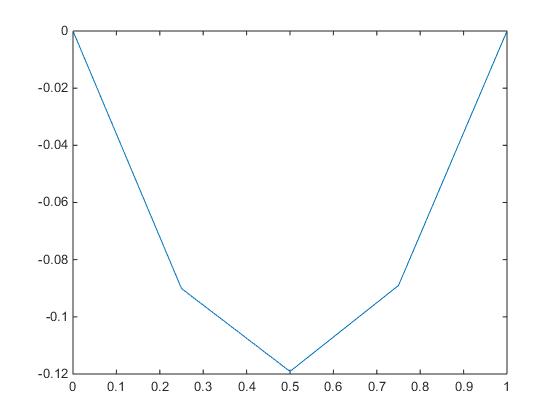
end

end

end

**Output:**



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